



Center for Experiential Learning & Career Success

TRINITY UNIVERSITY

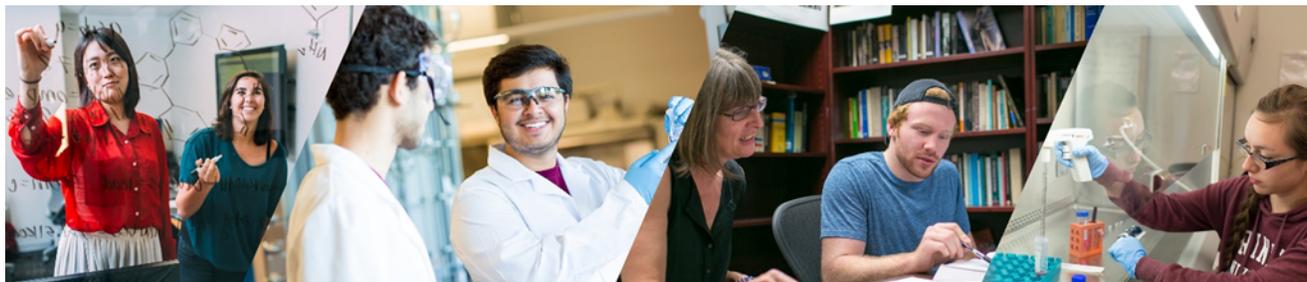
Summer Research & Internship Symposium

July 20-21, 2023



39th Annual
Department of Chemistry
Research Symposium

18th Annual
Summer Undergraduate
Research Conference



Summer Experiential Learning at Trinity

Students have participated in summer undergraduate research since the 1950s at Trinity, but it wasn't until 1984 when the Chemistry department sponsored the first Undergraduate Research Symposium that involved 10 participants. In 2023, 160 students engaged in summer research including through the Stumberg Summer Accelerator program. This year the Symposium also features 63 internship students from the Arts, Letters, and Enterprise (ALE); Mexico, the Americas, and Spain (MAS); and the John Donahue Social Justice programs. The 223 research and internship students this year have been mentored by more than 93 faculty mentors across 36 academic departments and disciplines.

The Welch Foundation has supported student and faculty researchers in chemistry since 1997. In addition, grants from the Merck Foundation (2001-2009) and the W. M. Keck Foundation (2003) supported research collaborations between biologists and chemists. The Tim and Karen Hixon Endowment (2013) supports students in summer research in environmental studies, and is awarded for work in the physical sciences, environmental policy or justice, and the humanities.

Grants in 2004 and 2008 from the Howard Hughes Medical Institute provided summer research fellowships for students in addition to transforming Trinity's curricular offerings in the sciences and enhancing outreach to local schools.

The National Science Foundation (NSF) supported Research Experiences for Undergraduate (REU) Programs at Trinity in chemistry (1989-2000), mathematics (1997-2008) and computer science (2008-2010). In addition to individual faculty research grants, NSF currently supports Trinity programs for scholarships for STEM majors (FAST and FASTER Programs). In addition, the Beckman Foundation supports undergraduate research in Biology, Chemistry, and Neuroscience.

In recent years, undergraduate research in non-STEM fields have developed and grown. In 2008, Trinity started a Ronald E. McNair Post-Baccalaureate Achievement Program with funding from the U.S. Department of Education. In 2011, Trinity launched the Murchison Fellowships program, which funds summer projects proposed by faculty-student teams. The University also supports research opportunities through operating funds. Earlier this year, Trinity received another award from the Andrew W. Mellon Foundation to continue its support of undergraduate research in the arts and humanities. Summer research experiences are also supported in Urban Studies thanks to a grant from the San Antonio Housing Authority. Entrepreneurship students are also engaged in scholarly experiential learning due to grant funding from the Stumberg Foundation and the 80/20 Foundation.

We hope you enjoy the 2023 Summer Research and Internship Symposium!

Dr. Adrian Zapata (Asst. Dir, Service Learning & Undergraduate Research),
LadyStacie Rimes-Boyd, J.D. (Assoc. Dir, Campus Relations) & **Katie Ramirez** (Director)
& the Center for Experiential Learning and Career Success Team

Conference Agenda 2023

Thursday, July 20, 2023		
9:30-10:30 AM	Coffee & Check-in	CSI 256
10:15 AM- 11:45 AM	Multidisciplinary Oral Presentation Session #1A	CSI 437
	Multidisciplinary Oral Presentations Session #1B	CSI 430
	Multidisciplinary Oral Presentations Session #1C	MMS 225
12:00-1:30 PM	Box Lunch Available & Keynote Panel	CSI Atrium
1:45-3:15 PM	Multidisciplinary Oral Presentation Session #2A	CSI 430
	Multidisciplinary Oral Presentation Session #2B	CSI 437
	Multidisciplinary Oral Presentation Session #2C	MMS 225
3:30-5:00 PM	Reception & Poster Session #1	CSI 256/282
Friday, July 21, 2023		
8:30-9:30 AM	Continental Breakfast, Coffee & Check-in	CSI 256
8:35 AM	Introductory Remarks: Chemistry Research Symposium	Stieren
8:45-10:20 AM	Chemistry Oral Presentation Session #1	Stieren
9:45-11:15 AM	Multidisciplinary Oral Presentation Session #3A	CSI 430
	Multidisciplinary Oral Presentation Session #3B	CSI 437
	Multidisciplinary Oral Presentation Session #3C	MMS 225
10:35 AM-12:10 PM	Chemistry Oral Presentation Session #2	Stieren
11:30 AM-12:30 PM	Poster Session #2	CSI 256/282
12:15-1:30 PM	Lunch Available	CSI Atrium
1:30 - 3:00 PM	Chemistry Oral Presentation Session #3	Stieren
1:45- 3:30 PM	Multidisciplinary Oral Presentation Session #4A	CSI 430
	Multidisciplinary Oral Presentation Session #4B	CSI 437
	Multidisciplinary Oral Presentation Session #4C	MMS 225
3:15 - 4:30 PM	Chemistry Oral Presentation Session #4	Stieren

3:45 - 5:00 PM	Multidisciplinary Oral Presentation Session #5A	CSI 430
	Multidisciplinary Oral Presentation Session #5B	CSI 437

Poster Session #1
Thursday, July 20, 3:30-5:00 PM
Center for Sciences & Innovation 256/282 (Design Cube)

#	Presenter(s)	Title	Mentor(s)
1	Maria Nayeli Aleman	Researching Mexican American History with the Mexican American Civil Rights Institute	Dr. Urquijo-Ruiz
2	Hailey Arias and Nathalia Fernandez	Neurotransmitter Identity and Synaptic Strength of Projections from the Pedunculo-pontine Tegmental Nucleus to the Substantia Nigra Pars Compacta Dopaminergic Neurons	Dr. Gerard Beaudoin
3	Arial Baker	An Internship with Healthy Futures of Texas: Helping Promote Sexual Health Education in San Antonio	Dr. Jennifer Henderson
4	Alyssa Baldwin	Anterograde and Retrograde tracing of neuron in the Pedunculo-pontine Tegmental Nucleus to Substantia Nigra Pars Compacta Dopaminergic Neurons	Dr. Gerard Beaudoin
5	Paige Bensing	Isolated male and female rats demonstrate social conditioned place preference	Dr. K.C. Leong
6	Ollie Bowen	Prevalence and Impact of the Model Minority Stereotype on Asian American Students at Trinity University	Dr. Elaine Wong
7	Emily Brodie	Understanding the Late Jurassic Nevadan Orogeny: Detrital Zircon Analysis of the Galice Formation, CA and OR	Dr. Kathleen Surpless
8	Cierra Cadena	Interning at the American Indians in Texas at the Spanish Colonial Missions	Dr. Jennifer Mathews
9	Richard Dunn	Evaluating the Effect of Truncations to the U5-snRNP Protein Dib1	Dr. Corina Maeder
10	Ashleigh Reese	Investigating the functional conservation between yeast and human Fig4 in yeast cell growth assays	Dr. Bethany Strunk
11	Noah Gilbertson	Synthesis and Evaluation of Second Generation ROS Activatable Prodrugs	Dr. Christina Cooley
12	Rudy Castro	Korean Language Acquisition with Korean Dramas	Dr. Althea Delwiche
13	Thor Yeary	Become a Conservation Hero: Empowering Citizen Science for Wildlife Preservation	Dr. James Shinkle
14	Alessandra Finol	The garden study of UV-B absorbing pigments in two dicot species	Dr. James Shinkle
15	Mason Fraser	Exploring the Connections Between Microaggressions, Ethnic Identity and Self-Concept Clarity	Dr. William Ellison
16	Robert Furuya	Mechanical Improvements to the Autonomous Planetary Rover	Dr. Kevin Nickels

17	Amelia Gibbs	Calibration of the method of images for regularized Stokeslets using sphere motion near a boundary	Dr. Hoa Nguyen
18	Michah "Kent" Hamatani	Invisible Strings: The Math that Binds Districts	Dr. Eduardo Cabral Balreira
19	Emily (EJ) Jamieson	Water Collection & Soil Percolation: A Summer with GEAA	Dr. James Shinkle
20	Audrey Jennings	Modeling Fault-Related Deformation and the Implications for Geothermal Energy	Dr. Benjamin Surpless
21	Margaret Karim	Uncontrolled Photoinitiated Fluorogenic Polymerization as a Strategy for Open-air, High Throughput Analyte Detection	Dr. Christina Cooley
22	Luthary Segura	Optimizing Drug Development Modeling Using Scientific Machine Learning Targeting Protein Aggregation in Alzheimer's and Diabetes	Dr. Kwan K. Cheng
23	Zachary Moyer	Effects of Small Colony Formation on the Swimming and Feeding performance of Choanoflagellates	Dr. Hoa Nguyen
24	Kinsey Jeansonne	Understanding the Relationship Between Narcissism and Writing Production	Dr. Kwan K. Cheng
25	Faith Perry	How Children Learn Verbs When Faced with Referential Ambiguity	Dr. Jane Childers
26	Ezekiel Negrete	Parameter Estimation of the Mark-Houwink-Sakurada Equation for the Characterization of the Molecular Weight of PEG/PEO-Based Polymers	Dr. Dany Munoz-Pinto
27	Ella Jones	Effects of Natural Short and Long Wavelength UVB Radiation on <i>B. curtispindula</i> and <i>C. latifolium</i> in Kerrville and Mico, TX	Dr. James Shinkle
28	Jess Rugeley	Phase Behavior and Reactivity of α -Keto Acids at air Water Interfaces	Dr. Rebecca Rapf
29	Marco Botello and Jackson Witkow	Kinetic Analysis of Sulfite Loss Mechanisms in Aqueous Solutions	Dr. Rebecca Rapf
30	Ariana Castillo, Maya Ozymy, and Vivian Spinks	Analyzing Early Math Concepts and Teaching Strategies Employed in Children's Educational TV Shows	Dr. Rebecca Densley
31	Jordan Dozier	Busting Open a San Antonio Time Capsule	Dr. Alfred Montoya

Poster Session #2
Friday, July 21, 11:30 AM - 12:30 PM
Center for Sciences & Innovation 256/282 (Design Cube)

#	Presenter(s)	Title	Mentor(s)
32	Thomas Bates	Mammalian biodiversity and human impact in Acadia National Park, Maine	Dr. Brittany Slabach
33	Giovanna Campolo	Grant Writing and Fundraising in the World of Nonprofits	Dr. Benjamin Sosnaud
34	Ian Crain, Uriel Eddy, Madelyn Holveck, Josephine Mitchell, Olivia Saari, and Anna Sotiriades	To stay or go: Can weakling nestlings beat the odds by leaving home early?	Dr. Troy Murphy
35	Lauren Dotson and Alex Rodriguez	Investigating Novel Fig4 Binding Partners with Potential Implications to Neurodegenerative Diseases	Dr. Bethany Strunk
36	Amanda Flanagan and Alice Dang	Differentiation of HT22 Cells Leads to Reduced Cell Cycle Progression and Increased Cell Death	Dr. Gerard Beaudoin
37	Olivia Predmore	Bloom Where You Are Planted: My Summer with Green Spaces Alliance	Maranda Larsen
38	Angela Graf	Atomic Collisions with a Trapped Ion	Dr. Nirav Mehta
39	Colin Houston and Dean Zach	Local journalism in an era of misinformation: a summer with the San Antonio Current	Dr. Melissa McMullen
40	Cole McGuire	A Deep Learning Approach to Gene Function Prediction	Dr. Matthew Hibbs
41	Remi Kurita	Pre-eruptive heating may aid magma degassing and reduce the risk of explosive volcanic eruptions	Dr. Kurt Knesel
42	Aliya Lackan	Male rats exposed to a socially-paired context decrease preference for a sucrose-paired context in a conditioned place preference paradigm	Dr. K.C. Leong
43	Austin Lee and Mikayla Potts	Differential Neuroinflammatory Response in Neural Stem Cells and Astrocytes to the Presence of Reactive Oxygen Species.	Dr. Dany Munoz-Pinto
44	Melanie Littell	Improving Mental Health One Community at a Time	Dr. Jane Childers
45	Wendy Ortega and Devon Bellamy	Sequential Fabrication and Physical Characterization of Multi-Interpenetrating Polymer Networks for the Study of the Inflammatory Response of Human Astrocytes	Dr. Dany Munoz-Pinto
46	Matvei Popov	3D Animation Stylization with Graph-Based Phase Autoencoder	Dr. Mathew Hibbs
47	Demi Durham	3D Computer Modeling of the Sevier Fault Zone	Dr. Benjamin Surpless
48	Natalia Santos	"Why Amylin?" The hormone implicated in neural toxicity of tau protein in the Alzheimer's brain	Dr. Kwan K. Cheng

49	Madison Sears	Non-Stratiform Dolomitization on the Margins of the Great Bank of Guizhou, South China	Dr. Daniel Lehrmann
50	Emma Utzinger	Editing the Religious Writings of Harriet Beecher Stowe	Dr. Claudia Stokes
51	Gary Sun, Alice Dang,	Using Notch/Delta Proteins from a Nematode as a Signaling System in vivo	Dr. Gerard Beaudoin
52	Anirudan Sivaprakash	Investigation of Altered Cellular Localization of Disease Related Mutants of Fig4	Dr. Bethany Strunk
53	Cinthia Morales	Niños Sin Fronteras: Advocating for the rights and well-being of young people seeking asylum in the United States	Dr. Rocio Delgado
54	Carmine Villarreal and Angela Allen	Oxytocin Modulates Excitatory and Inhibitory Inputs to Dopamine Neurons in the Ventral Tegmental Area	Dr. Gerard Beaudoin
55	Ashwini Vivek	Assessing cognition in infant marmosets (<i>Callithrix jacchus</i>) with eye-tracking technology	Dr. Kimberley Phillips
56	Grace Magavern, Coby Wellman, Joslyn Boyer, and Robin Gemanaru	The Impact of Fungal Endophytes on Native and Invasive Grasses	Dr. Kelly Lyons
57	Cass Williams	How we Teach and Remember the Alamo	Dr. Lauren Turek
58	Taylor Yates	Oxytocin attenuates stress-induced responding for oxycodone under a progressive ratio schedule in male rats	Dr. K.C. Leong
59	Lily Zeng	Diversifying the Narrative: Oral Histories of Asian-Americans in the Westside	Dr. Urquijo-Ruiz
60	Kily Jasso	Using an Online Database to Calculate the Statistical Significance of Genes Involved in Biological Functions	Dr. Mathew Hibbs
61	Sandra Gurrola	Disability in Fairy Tale Forests	Dr. Heather Sullivan
62	Alice Dang and Manisha Saraswathi	Creation of Novel Technique for Breaking Long Range Neural Circuits	Dr. Gerard Beaudoin
63	Dalex Zenteno	A New Summer at Say Sí: From Student to Intern	Dr. Jennifer Mathews

Oral Presentations: [Multidisciplinary Session #1A](#)
Thursday, July 20, 10:15 AM- 12:00 PM
Moderator: Jennifer Rames
CSI 437

#	Time	Presenter(s)	Title	Mentor(s)
1	10:15 AM	William Abbott	Cultivating Brand Growth: Empowering Gardopia's Brand Awareness	Dr. Kelly Lyons
2	10:30 AM	Choudhry Abdulla	Bridging the Gap: Context-Aware Hate Speech Detection in Low-Resource Languages	Dr. Eva Tuba
3	10:45 AM	Annick Ambrose	Behind the Scenes: The Back Hallway	Dr. Kate Ritson
4	11:00 AM	Anita Ashok	Activating Texas Voters to Detect Partisan Gerrymandering	Dr. E. Cabral Balreira
5	11:15 AM	Denae Barkocy	'Write On' : Exploring artistic communities in San Antonio and beyond	Dr. Kathryn Santos
6	11:30 AM	Kasey Barrett	Chasing Change: Solving Animal Homelessness in San Antonio	Jeanna Balreira
7	11:45 AM	Max Sebbar	Exploring Environmental Stewardship: San Antonio River Foundation	Jennifer Rames

Oral Presentations: [Multidisciplinary Session #1B](#)
Thursday, July 20, 10:15 AM-11:45 AM
Moderator: Paul Bernal
CSI 430

#	Time	Presenter(s)	Title	Mentor(s)
8	10:15 AM	Sebastian Barahona	The Link Between Star Formation Rate and Ultraluminous X-ray Sources	Dr. David Pooley
9	10:30 AM	Molly Barkis	Creating Community In the Outdoors: A Look Into Culture, Creativity, and Compassion With The San Antonio Parks Foundation	Katie Ramirez
10	10:45 AM	Ayden Bartsch	Creating Tangible Good	Dr. Carl Leafstedt
11	11:00 AM	Reece Brown	Inexpensive Self-aligning Interferometer	Dr. Dennis Ugolini
12	11:15 AM	Nadia Kern	Too Many Polar Bears, Not Enough People: Content Analysis of AI Generated Climate Change Depictions	Dr. Althea Delwiche
13	11:30 AM	Cutter Canada	Animal Heroes and Children Activists: A Case Study of Animal Depictions and Archetypes in AI-Generated Stories	Dr. Althea Delwiche

**Oral Presentations: [Multidisciplinary Session #1C](#)
 Thursday, July 20, 10:15 AM-11:45 AM
 Moderator: Mari Benavides
 MMS 225**

#	Time	Presenter(s)	Title	Mentor(s)
14	10:15 AM	Claire Carpenter	Disney said gay: Employee activism, Governor Desantis, and the fight for LGBTQ+ rights	Dr. Camille Reyes
15	10:30 AM	Mia Carrasco	The DoSeum: Spreading Joy and Curiosity as Far as They Can Reach	Dr. Wilson Terrell
16	10:45 AM	Chloe Castro	Different Asylum Cultures' Opinions on Refugees	Dr. Mario Gonzalez-Fuentes
17	11:00 AM	Jake Cipolla	Beyond Pitches and Rhythms: Backstage at the Symphony	Dr. Carolyn True
18	11:15 AM	Lee Denney and Seb Mora	Commemorando a la Comunidad: Latinx Experiences at Trinity	Dr. Dania Abreu-Torres
19	11:30 AM	Mahika Desai, Nicola Ferguson, Jordan Ha	Construction of an inducible GFP plasmid to study motility dynamics in Pseudomonas aeruginosa and Escherichia coli	Dr. Frank Healy

**Oral Presentations: [Multidisciplinary Session #2A](#)
 Thursday, July 20, 1:45-3:15 PM
 Moderator: Sinclair P. Caesar III
 CSI 430**

#	Time	Presenter(s)	Title	Mentor(s)
20	1:45 PM	Dawson Durr	Digital Extenders Project	Dr. Emma Treadway
21	2:00 PM	Kiran Esani	Spend a Day in my Genes	Maranda Larsen
22	2:15 PM	Nicola Ferguson	A Directed Evolution Approach to Understanding Structural and Functional Features of Bacterial Stators	Dr. Frank Healy
23	2:30 PM	Laura FitzSimon	Multi-Species Relationships and Entanglement in Jeff VanderMeer's Southern Reach Trilogy	Dr. Heather Sullivan
24	2:45 PM	Erin Galvin	A Palette of Possibilities: A Reflection on My Internship at the San Antonio Museum of Art	Dr. Jacob Tingle
25	3:00 PM	Garrett Greiner	Multi-Modal EEG NEO-FFI with Trained Attention Layer (MENTAL) for Mental Disorder Prediction	Dr. Yu Zhang

Oral Presentations: Multidisciplinary Session #2B
Thursday, July 20, 1:45-3:15 PM
Moderator: Paul Bernal
CSI 437

#	Time	Presenter(s)	Title	Mentor(s)
26	1:45 PM	Jordyn Guzman	How San Antonio's Catholic Women Contributed to World War II Efforts	Dr. Sarah Luginbill
27	2:00 PM	Jordan Ha	Fluorescent Imaging of Pseudomonas aeruginosa: Filament and Cell Body Labeling	Dr. Frank Healy
28	2:15 PM	Harrison Hartman and Noor Jahlul	Cisnormativity and Strategic Disclosure in the Family	Dr. Amy Stone
29	2:30 PM	Caroline Parish	We Are Family: The Social and Theological Impact of Matthew's Genealogy (Matt 1:1-17)	Dr. Kimberly Bauser McBrien
30	2:45 PM	Adrian Herrera	Aerodynamic Characterization of a Free-Flight Sphere and Redevelopment of an Electromechanically Actuated Pitot Probe in a Mach 7 Wind Tunnel	Dr. Christopher S. Combs
31	3:00 PM	Casimir Huffman	A Little Bit of Everything	Dr. Stacey Connelly

Oral Presentations: Multidisciplinary Session #2C
Thursday, July 20, 1:45-3:15 PM
Moderator: Becca Burt Steinbach
MMS 225

#	Time	Presenter(s)	Title	Mentor(s)
32	1:45 PM	Gabriela Jodas Salgado	A cross-cultural examination of story formats and their elements as drivers of engagement in consumer contexts	Dr. Mario Gonzalez-Fuentes
33	2:00 PM	Jaida Johnson	Analyzing the Rhetoric and Mannerisms of Middle Eastern Dictators	Dr. David Lesch
34	2:15 PM	Marco Jonsson	Taylor-Couette Vortex Flow: Design and Construction of a Research-Grade Testing Apparatus	Dr. Orrin Shindell
35	2:30 PM	Dakotah Brown	Internship At San Antonio African American Community Archive and Museum	Dr. Lauren Turek
36	2:45 PM	Omarree Kimbrough	Modeling the Glass Transition with a Two-Dimensional Colloid	Dr. Orrin Shindell
37	3:00 PM	Helene Le Gall	From Coyotes to Conjugation - Translating Skills to New Environments	Katie Ramirez
38	3:15 PM	Lydia Heisel	Park Advocacy: Blending Community and Conservation at Phil Hardberger Park	Katie Ramirez

**Oral Presentations: [Multidisciplinary Session #3A](#)
 Friday, July 21, 9:45 – 11:15 AM
 Moderator: Sinclair P. Caesar III
 CSI 430**

#	Time	Presenter(s)	Title	Mentor(s)
39	9:45 AM	Joseph Kusnadi	Intern at disABILITYsa	Dr. Carl Leafstedt
40	10:00 AM	Ektoras Lambrou	Novel Immunological Reagents for the Identification of Biomarkers in New World Monkeys	Dr. Luis Giavedoni
41	10:15 AM	Adam Kingery	The Contemporary and its Past: an archival journey	Dr. Kate Ritson
42	10:30 AM	Mitchy Lee	Boundary Approximations of Curves for Planar Dynamical Systems	Dr. Seth Fogarty
43	10:45 AM	Monica Martinez	Not just News: a plethora of Opportunities at the San Antonio Report	Dr. Jacob Tingle
44	11:00 AM	Cristian Martinez	The Center of Conversation: A Conscientious Approach to Business in Downtown San Antonio	Dr. Jacob Tingle

**Oral Presentations: [Multidisciplinary Session #3B](#)
 Friday, July 21, 9:45 – 11:15 AM
 Moderator: Jennifer Rames
 CSI 437**

#	Time	Presenter(s)	Title	Mentor(s)
45	9:45 AM	John McMahon	Enhancing the efficiency of FRET using surface plasmons waves on gold nanogratings	Dr. Jennifer Steele
46	10:00 AM	Taylor Miner	Kindled Spark to Burning Interest: Prescribed Fire Mapping and Web Application in ArcGIS	Dr. James Shinkle
47	10:15 AM	Ryann Moos	FHAM Project: Analyzing the Relationship between LGBTQ+ Siblings	Dr. Amy Stone
48	10:30 AM	Marcos Morales, Utsavi Joshi, Jose Hernandez, and Kevin Hand	BFit - Merging the gap between business and product	Carmen Aramanda
49	10:45 AM	Jordan Nelson	The Grim Anatomy of Fascist Political Violence: Tötungsbereitschaft in Carl Schmitt's Der Begriff des Politischen	Dr. Nicholas Reynolds
50	11:00 AM	Chukwunonyelum (Nonye) Okoye	Non-Profit Advocacy: The Busy Bees Build A Community	Dr. Norma Elia Cantu

Oral Presentations: [Multidisciplinary Session #3C](#)
Friday, July 21, 9:45 – 11:15 AM
Moderator: Becca Burt Steinbach
MMS 225

#	Time	Presenter(s)	Title	Mentor(s)
51	9:45 AM	Mitch Overton	Well and Worthy: Dare to Redefine Women's Wellness	Carmen Aramanda
52	10:00 AM	Seth Owirodu and Quang Le	Leveraging Steam Game Reviews for Enhanced Recommendation Systems	Dr. Sheng Tan
53	10:15 AM	Cristian Holloway and Garrett Palmer	Evaluation of the ZO-1-ZU5 Domain in Epithelial Tight Junction Regulation	Dr. Jonathan King
54	10:30 AM	Samantha Miller	Be a Swiss Army Knife: A Summer of Growth at San Antonio Sports	Dr. Jacob Tingle
55	10:45 AM	Claire Sammons	The Way Things Change: A Look at the Museum Industry Through Archives from the Last 30 Years	Dr. Kate Ritson
56	11:00 AM	Heath Schake	Internship at Kalos	Dr. Ruben Dupertuis

Oral Presentations: [Multidisciplinary Session #4A](#)
Friday, July 21, 1:45 – 3:30 PM
Moderator: Mari Benavides
CSI 430

#	Time	Presenter(s)	Title	Mentor(s)
57	1:45 PM	Kate Schulle	Visualizing Holocaust Testimony	Dr. Victoria Aarons
58	2:00 PM	Harper Horn-Clegg	Classroom Censorship in Texas Schools	Dr. Habiba Noor
59	2:15 PM	Sophie Shields	Consulting at Kalos Strategies	Dr. Tim O'Sullivan
60	2:30 PM	Anthony Sierra	Cultivating Ourselves Through Nature: a San Antonio Botanical Garden Internship	Jennifer Rames
61	2:45 PM	Hillary Solomon	Carving out History: My Time at the Carver Center	Dr. Jacob Tingle
62	3:00 PM	Gabriella Stein	Tech and Beyond: a peek into life at the Public Theatre	Dr. Stacey Connelly
63	3:15 PM	Xinyi Zhang	Key to Employability for Business Analytics Undergraduates: Evidence from LinkedIn Data	Dr. Tianxi Dong

Oral Presentations: [Multidisciplinary Session #4B](#)
Friday, July 21, 1:45 – 3:30 PM
Moderator: Jennifer Rames
CSI 437

#	Time	Presenter(s)	Title	Mentor(s)
64	1:45 PM	Hannah Supranowicz	Pseudomonas aeruginosa Motility Near Surfaces	Dr. Orrin Shindell
65	2:00 PM	Peyton Tabor	Stem Cell Adherence: Improving Process of iPSCs' Attachment Used for Stem Cell Therapy	Dr. James Shinkle
66	2:15 PM	Corrinne Tallman	The Tuesday Musical Club: Empowering Women Through Music Since 1901	Dr. Carl Leafstedt
67	2:30 PM	Cal Taylor	Indigenous Historical Preservation at AITSCM	Dr. Lauren Turek
68	2:45 PM	Sarah Theuret	Trouble Brewing: Adolphus Busch's Legal and Political Battles	Dr. Todd Barnett
69	3:00 PM	Victoria Torres	Bacterial Motor Mechanics	Dr. Orrin Shindell
70	3:15 PM	Anna Miller	LGBTQ+ Youth's Experiences Moving Out and Gaining Independence	Dr. Amy Stone

Oral Presentations: [Multidisciplinary Session #4C](#)
Friday, July 21, 1:45 – 3:30 PM
Moderator: Sinclair P. Caesar III
MMS 225

#	Time	Presenter(s)	Title	Mentor(s)
71	1:45 PM	Andrew Tyler	Hope and Healing: Experiences from the Children's Bereavement Center of South Texas	Dr. Jacob Tingle
72	2:00 PM	Kai Velasquez	Buena Gente y Esperanza: An Analysis of Community and Nonprofits	Dr. David Spener
73	2:15 PM	Katherine Dixon and Nathan Warpmaecker	Optimizing the placement of fluorescent molecules above gold nanogratings for the enhancement of FRET.	Dr. Jennifer Steele
74	2:30 PM	Mary Whaley	Pneumatic Exoskeleton implementation for Self-resisting Exercise	Dr. Emma Treadway
75	2:45 PM	Jillian Wold	From PIDventory to Ping-Pong: Understanding Placemaking in Downtown San Antonio	Dr. Jacob Tingle
76	3:00 PM	Gabriela Yeackle	ConnectABILITY: Restoring Hope Through Civic Engagement	Dr. Carl Leafstedt

77	3:15 PM	Cecilia Parker	Needs and Assets Assessment for Bexar County Community Care Coalition	Dr. Alfred Montoya
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**Oral Presentations: [Multidisciplinary Session #5A](#)
Friday, July 21, 3:45 – 5:00 PM
Moderator: Mari Benavides
CSI 430**

#	Time	Presenter(s)	Title	Mentor(s)
78	3:45 PM	James Ogunrin	Trinity Summer Accelerator Program- Understanding the value of an effective business model	Carmen Aramanda
79	4:00 PM	Ruth Patterson	Recreating the Artpace Library Through the Dewey Decimal System	Dr. Kate Ritson
80	4:15 PM	Alyndra Plagge	Understanding Interactions Between Affect and Identity in First- and Second-Year Engineering Students	Dr. Emma Treadway
81	4:30 PM	Abigail Power	The Foundation for a Strong Future: My Internship Experience with the Holt Family Foundation	Dr. Jacob Tingle

**Oral Presentations: [Multidisciplinary Session #5B](#)
Friday, July 21, 3:45 – 5:00 PM
Moderator: Jennifer Rames
CSI 437**

#	Time	Presenter(s)	Title	Mentor(s)
82	3:45 PM	Gaya Rajamony	The Ethics and Legality of AI Artwork	Dr. Paul Myers
83	4:00 PM	Sophia Relyea	Orchestrating Success: Behind the Scenes of YOSA	Dr. Carl Leafstedt
84	4:15 PM	Jake Ridenbaugh	X-Ray Observations of Hydrogen Deficient Supernovae	Dr. David Pooley
85	4:30 PM	Misael Rodriguez	Single-Frequency Environment Exploration on Contact Transitions	Dr. Emma Treadway

38th Annual Department of Chemistry Research Symposium

Friday, July 21 | Stieren Theater

Moderated by Dr. Rebecca Rapf

8:30 AM Introductory Remarks

Chemistry Session 1 • 8:45-10:20 AM

Stieren Theater

#	Time	Presenter(s)	Title	Mentor(s)
1	8:45-9:05	Nicholas Cipolla, Isabela Castillo, Gianna Garza	Fluorogenic ATRP as a Novel Polymerization Kinetic Assay	Dr. Christina Cooley
2	9:05-9:20	Devin Saenger	Investigating the Reduction Potential of the Rieske protein in <i>Spinacia oleracea</i>	Dr. Laura Hunsicker-Wang
3	9:20-9:35	Lilyanna Armstrong	Modified Cucurbit[n]urils	Dr. Adam Urbach
4	9:35-9:50	Andie Hadley	Synthesis, and Purification of α -Keto Acids as Model Systems for Understanding Air-Water Interface Reactivity	Dr. Rebecca Rapf
5	9:50-10:20	Brittany Uwaezuoke, Cadence McCammack, Adam Abou El Nour, Yves Iuera	Determining the Effects of Pre-messenger RNA Splicing in Retinitis Pigmentosa	Dr. Corina Maeder
	10:20-10:25		Group Photo	

**Chemistry Session 2 • 10:35 AM-12:10 PM
Stieren Theater**

#	Time	Presenter(s)	Title	Mentor(s)
6	10:35-10:55	Jess Rugeley, Claire Koltun	Phase Behavior and Reactivity of α -Keto Acids at Air-Water Interfaces	Dr. Rebecca Rapf
7	10:55-11:10	Marc Ewe	Cucurbit[8]uril Pair Inclusion Motif	Dr. Adam Urbach
8	11:10-11:25	Dana Sheehan	Classification of Plant Exudates via Principal-Component and Cluster Analysis of ^1H NMR Variables	Dr. Joseph Lambert
9	11:25-11:45	Maggie Karim, Nathan Siciliano	Synthesis of Fluorogenic Monomer Probes for Radical Polymerization	Dr. Christina Cooley
10	11:45-12:10	Graycen Hall, Omkar Satpathy, Katelyn Silverio	The Possible Effects of Rieske Reduction Potential on Superoxide Formation in the bc_1 Complex	Dr. Laura Hunsicker-Wang

**Chemistry Session 3 • 1:30-3:00 PM
Stieren Theater**

#	Time	Presenter(s)	Title	Mentor(s)
11	1:30-1:45	Thomas McPherson	Investigating the effect of cyclization and hydrophobicity of lipopeptides on antibacterial activity and toxicity	Dr. Nathalia Almeida
12	1:45-2:10	Richard Dunn, Bryce Dye, Jessica DuVon	Structural and Functional Characterization of Yeast Splicing Protein Dib1	Dr. Corina Maeder
13	2:10-2:25	Katherine Holt	Phase Behavior of Polycyclic Aromatic Hydrocarbon Derivatives at the Air-Water Interface	Dr. Rebecca Rapf
14	2:25-2:45	Elizabeth Batchinsky, Noah Gilbertson	Synthesis and Evaluation of Second-Generation ROS-Activatable Prodrugs	Dr. Christina Cooley
15	2:45-3:00	Taylor Fate	Toward an Insulin Analogue with High Affinity for Cucurbit[8]uril	Dr. Adam Urbach

Chemistry Session 4 • 3:15-4:35 PM
Stieren Theater

#	Time	Presenter(s)	Title	Mentor(s)
16	3:15-3:35	Jackson Witkow, Marco Botello	Kinetic Analysis of Sulfite Loss Mechanisms in Aqueous Solutions	Dr. Rebecca Rapf
17	3:35-3:55	Maddie Belvis, Wyatt Wisdom	Mutating D111 in the CuA protein to Determine the Reactivity of Ligating Histidines to Chemical Modifiers	Dr. Laura Hunsicker-Wang
18	3:55-4:15	Maggie Karim, Azarya Solomon	New Applications for Open-Air Photoinitiated Fluorogenic Polymerization	Dr. Christina Cooley
19	4:15-4:30	Connor Buchanan	Supramolecular Controlled Release	Dr. Adam Urbach

Abstracts

The following pages are presentation abstracts. This legend may be used for authors:

Names in **bold** are current undergraduate students.

Names followed by an asterisk (*) are presenters.

Names underlined are current faculty and staff mentors.

Cultivating Brand Growth: Empowering Gardopia's Brand Awareness

William Abbott*, Kelly Lyons

This summer I was given the opportunity to intern with Gardopia Gardens as a Digital Marketing Intern. My primary duties were social media content creation and supporting our gardening stewards. However, these were not my only duties. I quickly learned how to adapt to different challenges and pick up new skills. Whether that was learning how to plant fruit trees, networking at conferences, or becoming a videographer. Gardopia Gardens is a 501(c)3 nonprofit committed to building healthy communities through garden based learning. I'm a strong believer in protecting our environment and living a healthy lifestyle. While I'm not an environmental studies or biology student, I believe all of us need to understand where our food comes from, and what impacts it has on our planet and bodies.

My job focused on creating social media posts and captions, editing podcast episodes, and helping stewards at gardens across San Antonio. My social media responsibilities were focused on Facebook and Instagram, with the goal of increasing post engagement and follower count. I also edited and uploaded the episodes for the *Growing Our Future Podcast*. This podcast highlights community leaders in the health, environmental, and food sectors. Lastly, I spent a lot of time in the field. Whether I was on-site at Gardopia's headquarters or at one of the various gardens Gardopia has created across San Antonio. My duties would largely depend on the Garden I was visiting, but they could range from harvesting produce to teaching small children about gardening.

These tasks challenged me in new ways. Working in the gardens during the Texas sun is difficult and adopting a whole new skill set of gardening took some time. But these challenges expanded my mindset and gave me a newfound appreciation for what goes into producing our food.

Funding Source: Arts, Letters, and Enterprise Program

Bridging the Gap: Context-Aware Hate Speech Detection in Low-Resource Languages

Choudhry Abdullah*, Eva Tuba

Hate speech detection presents a complex challenge that necessitates context-aware mechanisms for effective resolution. Advanced machine learning techniques in natural language processing have yielded state-of-the-art models for hate speech detection in English. Recent advancements aim to develop models that provide a rationale for hate classification. Nonetheless, the lack of research and annotated data for languages with limited resources has resulted in hate speech classification models significantly lagging behind their counterparts in well-resourced languages.

This proposed research seeks to replicate existing hate speech detection models in low-resource languages through the utilization of various transfer learning approaches. Our objective is to implement innovative approaches based on rationality and examine their efficacy in resource-poor languages, paralleling their success in English-based models. To assess the performance of transfer learning models against their counterparts, we will conduct extensive comparisons using diverse metrics.

Developing MACRI Initiatives: Re-Claiming Mexican American History in the United States

Maria Nayeli Alemán*, Rita E. Urquijo-Ruiz

Since 2019, the Mexican American Civil Rights Institute (MACRI) has been committed to documenting the history of Mexican American civil rights, and advocating for further protections of civil rights in the present-day. My internship with MACRI expanded my understanding of Mexican American civil rights history, developed my experience in social media marketing, and introduced me to the process of exhibition curation.

My first project entailed finalizing captions and finding historical photos for MACRI's social media campaign which informs followers about historical events and people who have influenced the Mexican American community. After creating twenty-five posts, my second project was to craft an online timeline of Mexican American civil rights history for teachers who have courses on this topic. This poster will demonstrate the marketing work, and research that I have conducted for the timeline, specifically about labor strikes throughout the early 1900's and occurrences of student activism in higher education in the 1960's.

Working with MACRI granted me the opportunity to inform others, both formally and informally, about Mexican American civil rights history. I have significantly strengthened my research, marketing, and team-working skills all while learning what it is like to work in a start-up oriented non-profit organization.

Funding Source: MAS Alvarez Grant

Behind the Scenes: The Back Hallway

Annick Ambrose*, Kate Ritson

This summer I had the incredible opportunity to intern at the Contemporary at Blue Star. I interned under the Executive Director, Mary Heathcott, and have had a truly enriching experience working at such a wonderful place. The Contemporary team is composed of several astounding individuals working in development, curation, public relations, installation, education and general cuteness, if you are Duncan the Contemporary dog. On a daily basis I assisted with tasks around the office, as well as attended events, meetings, and visited other art affiliated organizations around San Antonio. This job allowed me to expand my knowledge in design and technical skills, communication skills, and prioritizing and presenting information.

Throughout the summer my priority was editing the weekly newsletter for the Contemporary, and designing an installation for the gallery. The focus of this installation is an homage to the Contemporary's history, as they recently went through a rebranding, and showcases all they've done, and all they are doing now. With this installation I wanted to highlight the main exhibitions and events of the Contemporary as it transitioned from an artist-run space in the late 1980's to its current status as a contemporary art center with strong ties to the San Antonio community.

With this internship I was so happy to dip my toes into the behind the scenes art world, and especially with such an innovative and successful nonprofit. I have always had some proximity to the art world, but this summer was so lucky to actually be immersed in it. Contemporary art centers are very difficult to maintain and sustain, and it has been such a treat to witness the tremendous job the Contemporary has done to keep the doors open. The Contemporary is exceeding expectations, nourishing the community, and is an impactful, important part of San Antonio.

Neurotransmitter Identity and Synaptic Strength of Projections from the Pedunculopontine Tegmental Nucleus to the Substantia Nigra Pars Compacta Dopaminergic Neurons

Hailey Arias*, Nathalia Fernandez*, Alyssa Baldwin, Megha Neelala, Aaron Elfezouaty, Moraima Rodriguez, Dylen Penny, Ishana Kheterpal, Catherine Hoffman, Logan Muzyka, Gerard M. J. Beaudoin, III

Dopamine plays a significant role in motivation and reward-seeking behavior particularly in the nigrostriatal dopaminergic pathway. Our research examines the connection between two specific midbrain regions, the pedunculopontine tegmental nucleus (PPN) and substantia nigra pars compacta (SNc) in order to look closely at their involvement in drug addiction. We are particularly interested in the PPN as it projects to both the same side (ipsilateral) and opposite side (contralateral), unlike other brain structures that typically limit their connections to one side. The PPN also contains neurons that release either excitatory or inhibitory neurotransmitters. To comprehend the nature of these inputs, the present study focuses on describing the hemispheric connections within the PPN-SNc synapse for both the type of neurotransmitter and relative synaptic strength for bilateral innervation.

We perform stereotaxic surgery to deliver a virus that expresses Channelrhodopsin (ChR2), a depolarizing light-gated ion channel, tagged with a yellow fluorescent protein. By activating the light-gated channels, we selectively depolarize PPN axons in the input region, stimulating synapses onto dopamine neurons. Electrophysiological tests allow us to record and quantify the excitatory and inhibitory responses within the PPN-SNc pathway. Lastly, brain slices are immunostained with antibodies to identify the neurotransmitter system of fluorescently-labeled PPN axons.

While further data collection is required, preliminary findings suggest that inhibitory PPN neurons innervate the SNc dopaminergic neurons on the same side. However, the excitatory PPN neurons innervate SNc bilaterally, though the synapse is stronger on the same side. Our research will provide valuable insights for future studies investigating the synaptic-level processes of the nigrostriatal dopaminergic pathway, which can contribute to the development of improved treatments and interventions for drug addiction.

Funding Sources: Brain and Behavior Research Foundation, Groff Foundation, McNair Scholars, Murchison Fellowship, Trinity University Biology Department

Modified Cucurbit[n]urils

Lilyanna Armstrong*, Adam R. Urbach

Cucurbit[n]urils (Qn's) are water-soluble synthetic receptors whose binding affinities and selectivities for small molecule guests have enabled a wide range of applications, from drug formulation and bioprobes to reversible hydrogels and waste remediation. The functionalities of cucurbit[6]uril (Q6) and cucurbit[7]uril (Q7), in particular, have been enhanced through their covalent attachment to resins, fluorescent dyes, polymers, and more. Synthetic efforts to functionalize cucurbit[8]uril (Q8), however, have been challenged by Q8's poor solubility. This presentation will describe the work we've carried out this summer toward optimizing the synthesis of hydroxylated Q8 by photo-oxidation and developing a novel purification method by HPLC.

Activating Texas Voters to Detect Partisan Gerrymandering

Anita Ashok*, **M. Kent Hamatani**, [E. Cabral Balreira](#)

Gerrymandering is the process of redrawing district lines in order to benefit a particular party or class. Drawing motivation from the Alabama Supreme Court case, *Merrill v. Milligan*, this project looks at partisan and racial gerrymandering in Texas by analyzing elections from 2012 to 2020. We developed an efficient method to generate districting plans for Texas data from the 2020 Census in order to detect gerrymandering via a measure called the Gerryindex. The Gerryindex provides a statistical way of estimating the number of safe and competitive congressional districts from a map ensemble to detect statistical anomalies such as cracking or packing, that is, spreading or concentrating a particular party's votes to dilute their political influence. To further identify these anomalies, we focused on the effect of increased voter turnout on the Gerryindex to determine how voter activation is related to gerrymandering. Our contribution is to develop voter activation models based on partisan, geographic, and racial features for each Voting Tabulation District to detect gerrymandering.

An Internship with Healthy Futures of Texas: Helping Promote Sexual Health Education in San Antonio

Arial Baker*, Jennifer Henderson

Healthy Futures of Texas is a nonprofit organization that facilitates sexual health education as well as advocates for an increase in young Texans' access to sexual health education and other resources. The organization offers multiple programs and curricula that help combat stigma around sex education, including, but not limited to, Texas Foster Youth Health Initiative, Campus Conversations, Big Decisions, Key Conversations, and the Youth Advocates. These programs offer a range of opportunities to young people and families, from implementing interactive and evidence-based curricula in schools to giving teens the opportunity to advocate for policies that affect them on a local and state level.

As a summer intern I was presented with a variety of opportunities. I studied various puberty curriculums and observed the facilitation of sexual health education. I also was able to work closely with the Youth Advocate program as they prepare for statewide expansion for the 2023-2024 school year. The program uses a Positive Youth Development framework to ensure that the cohorts are youth driven. In my time with the Youth Advocates, I sat in on a city council meeting, a Summit for Learning Among Youth (SLAY), and interviewed future youth advocates for the upcoming academic school year.

I applied to become an intern for Healthy Futures because of their mission and how it aligns with my own experiences and those of the people closest to me. There is a gap of knowledge when it comes to young people understanding the risks and identifying red flags in potentially unsafe situations. Quality sex education is important because it helps young people better understand their bodies and advocate for their needs.

Funding Source: MAS Alvarez Grant

Anterograde and Retrograde tracing of neuron in the Pedunculopontine Tegmental Nucleus to Substantia Nigra Pars Compacta Dopaminergic Neurons

Alyssa Baldwin*, Hailey Arias, Nathalia Fernandez, Megha Neelala, Aaron Elfezouaty, Moraima Rodriguez, Dylen Penny, Ishana Kheterpal, Catherine Hoffman, Logan Muzyka, Gerard M. J. Beaudoin, III

The neurotransmitter dopamine is heavily involved in motivation and reward, notably in the nigrostriatal dopaminergic pathway. Within this pathway, our research focuses specifically on the synapse between the midbrain regions pedunculopontine tegmental nucleus (PPN) and substantia nigra pars compacta (SNc). The PPN is unusual because it sends both ipsilateral and contralateral projections, as opposed to other brain structures which confine their innervations to either ipsilateral or contralateral. To understand the nature of these inputs, the current study focuses on confirming and characterizing the bilateral innervation within the PPN-SNc synapse using stereotaxic surgery and confocal microscopic methods.

We use unilateral stereotaxic surgery to deliver a virus expressing a depolarizing light-gated ion channel, Channelrhodopsin (ChR2), tagged with either a yellow or red fluorescent protein. Thus, we can characterize the PPN-innervated synapses to SNc dopaminergic neurons as either ipsilateral or contralateral to the injection site. Additionally, retrograde beads are injected into the SNc unilaterally to confirm the anterograde tracing results. Finally, we inject retrograde beads of two different colors to determine if individual PPN neurons project both ipsilaterally and contralaterally. Then, we measure the trafficking and macroscopic distribution of ipsilateral and contralateral projections in the SNc using confocal microscopy.

Preliminary findings suggest that the SNc has dual innervation, meaning that the PPN innervates SNc DA neurons from both hemispheres. Furthermore, there are more ipsilateral PPN innervation of SNc DA neurons than contralateral PPN innervations. Our findings will be placed in context of the nigrostriatal dopaminergic pathway to explicate addiction at the synaptic level.

Funding Sources: Brain and Behavior Research Foundation, Groff Foundation, McNair Scholars, Murchison Fellowship, Trinity University Biology Department

The Link Between Star Formation Rate and Ultraluminous X-ray Sources

Sebastian Barahona*, David Pooley

The goal of this research is to study the link between the location of neutron stars and black holes accreting material from companion stars at the highest accretion rates and the local star formation rate within nearby galaxies. These accreting objects, also known as Ultraluminous X-ray Sources (ULXs), could be intermediate mass black holes or they could represent a type of accretion onto a compact object that we don't fully understand yet. To accomplish this we took infrared and ultraviolet images from 200 nearby star forming galaxies and used them to generate star formation rate maps. We will use a normalized cumulative rank pixel value function to better understand the spatial correlation between the star formation rate in this sample of 200 galaxies and the location of any ULXs in each galaxy.

Creating Community In the Outdoors: A Look Into Culture, Creativity, and Compassion With The San Antonio Parks Foundation

Molly Barkis*, [Katie Ramirez](#)

Trinity University's Arts, Letters, and Enterprise summer internship program provided me with the valuable opportunity to work with the San Antonio Parks Foundation (SAPF) as a Communications and Events fellow. As a 501(c)3 non-profit organization, SAPF is dedicated to supporting and improving parks in San Antonio and Bexar County. With a rich history spanning 42 years, the foundation upholds six core values: Conservation, Community, Culture, People, Education, and Equity, serving as steadfast champions of these principles.

During my internship, I was able to apply my skills as a grassroots environmentalist and outdoor educator while also gaining new knowledge and experience through collaboration with a close-knit team of experts in the Corporate Social Responsibility (CSR) and Environmental Social Governance (ESG) sectors. Under the guidance of my supervisor, Libby Day, we identified several action items in my first week and built upon them as tasks were completed and new opportunities for growth emerged.

My responsibilities encompassed a range of vital initiatives, including the creation of an inclusive and engaging social media presence, the development of children's engagement activities for current and future events, the planning of community input meetings featuring bilingual programming in Spanish and English, the design of brand-centered merchandise to raise funds and awareness for the foundation, and the establishment of partnerships with local businesses, artists, and vendors to amplify the voices and celebrate people of San Antonio.

This immersive experience has equipped me with invaluable knowledge and understanding, enabling my professional growth as a guardian of the environment and advocate for communities. It has provided profound insights into the significance of community-centered work within the realm of governmental and social organizations. I eagerly anticipate applying the perspectives I have gained to all my future endeavors, with a continued commitment to making a positive impact.

Funding Source: Arts, Letters, and Enterprise Program

Write On: Exploring Artistic Communities in San Antonio and Beyond

Danae Barkocy*, Kathryn Vomero Santos

This summer, I had the privilege to intern with Gemini Ink, San Antonio's Writing Arts Center. Gemini Ink's goal is to teach the art of writing to authors of all skill levels, thus creating more accessible educational opportunities within the San Antonio community. They teach free and low-cost workshops in San Antonio schools, shelters, rehabilitation centers, and prisons. In this internship, I developed new professional and technical skills and learned how to navigate the city on foot and via public transportation. I formed lasting connections with the artistic community that Gemini Ink seeks to serve.

As a marketing intern at Gemini Ink, I gained hands-on proctoring experience by hosting two online courses with authors from across the country. One course, "Tell All the Truth, but Tell it Slant", was taught by Thomas McNeely, the author of the award-winning book *Ghost Horse*. This class brought a community of writers together for a workshop on trauma writing. The second course, "The Creative Writer's Professional Toolkit", introduced me to Lyzette Wanzer, a gifted poet and writing instructor from San Francisco. I also worked with my supervisor to finish Gemini Ink's summer course schedule, which allowed me to hone my writing and graphic design skills. I was proud to distribute the schedules throughout the Pearl, King William, Olmos Park, and Downtown areas and to engage with local residents in the process.

Working for Gemini Ink taught me a variety of additional skills that I will carry throughout my post-graduate experience. I became proficient in MailChimp, learned to write press releases, and learned about web design. By exploring the inner workings of a nonprofit, I have also discovered career paths that are unconventional but exciting for a Political Science major. I have thrived in Gemini Ink's collaborative environment, rooted in the vibrant San Antonio community.

Beyond Their Control: Combatting Animal Homelessness in San Antonio

Kasey Barrett*, Jeanna Balreira

This summer I worked as a Marketing intern at SNIPSA alongside Intake Manager Sherri Fichter and Marketing Coordinator Hayley Everts. SNIPSA is a non-profit animal rescue dedicated to a multifaceted solution regarding animal homelessness. Through increasing spay and neuter resources, creating more adoption opportunities, producing educational pet owner resources, and engaging with the San Antonio community, SNIPSA hopes to relieve the woes of animal homelessness.

As a Marketing intern, I engaged with SNIPSA at one of its most important levels—community interaction. Pet homelessness is a community problem that requires community solutions. With a constant need for volunteers, fosters, and adopters, public awareness is critical. To assist in this constant promotion of our cause, I participated in several projects. My graphics received attention and worked to make a difference in a variety of ways, including adoptable pet features, pet of the week Instagram posts, and foster callouts. Additionally, I had the opportunity to manage SNIPSA’s youtube channel for the entirety of my internship. The channel includes videos promoting our rescues and uploading clips of them to their website. Two of my larger and more personal projects consisted of a newsletter entitled “The WAG” and redesigning donation houses. All of my tasks as an intern working with a goal in mind—engage an audience and change San Antonio for the better.

My internship at SNIPSA has provided me with the experience of facing harsh realities and what one can do to fix them. In a tireless pursuit to combat animal homelessness, SNIPSA has allowed me to utilize my creative ability and understand that I can make a difference. I learned the moving parts of a nonprofit organization and built on my existing skills that can work to alter my community.

Funding Source: Arts, Letters, and Enterprise Program

Creating Tangible Good

Ayden Bartsch*, Carl Leafstedt

This summer I had the opportunity to intern at the Kronkosky Charitable Foundation through Trinity's Arts, Letters, and Enterprise program. The Kronkosky Charitable Foundation is a local nonprofit that supports programs, projects and organizations that align with the foundation's key focus areas in the Bandera, Bexar, Comal, and Kendall counties. As an intern at the foundation, my main role involved shadowing staff members on site visits and meetings, assembling documents for board meetings, drafting research briefs on our focus areas, and attending community events in support of philanthropy.

My experience as an intern at the foundation taught me skills that will aid in my professional future such as prioritization of tasks, communication, and organizational skills. I have formed a greater understanding of the grant writing process as well as gained exposure to the vast community of nonprofit organizations within my community. I have also gained confidence along the way, by finding my voice in conversations and not being afraid to ask questions when I need support.

Most meaningful to me, however, was seeing firsthand just how many elements go into running a nonprofit, as well as how many amazing organizations exist in my home city and are doing important work. At the end of my internship, I now see a future for myself in the nonprofit field as well as an overall appreciation for the individuals who work to make a measurable difference within the community and its surrounding areas.

Funding Source: Arts, Letters, and Enterprise Program

Synthesis and Evaluation of Second-Generation ROS-Activatable Prodrugs

Elizabeth Batchinsky*, Noah Gilbertson*, Christina Cooley

AA147 is a small molecule activator of ATF6, a transcription factor of the Unfolded Protein Response (UPR), a stress-responsive signaling pathway that mitigates the misfolding of proteins with the ability to enable the scavenging of damaging Reactive Oxygen Species (ROS). However, constant activation of the UPR by AA147 can lead to liver disease, and in extreme cases, apoptosis.

To avoid global ATF6 activation, the Cooley Lab is working to develop various prodrugs of AA147 that are biologically inactive until encountering diseased tissue due to the installation of a boronic ester cage system. These inactivated prodrugs will remain inactive until they come into contact with ROS levels indicative of disease.

As ROS levels are highly upregulated following an ischemia-reperfusion event (stroke/heart attack), a prodrug was designed and synthesized that would release AA147 into diseased tissue through a reaction with hydrogen peroxide, a type of ROS. Although the prodrug was able to release AA147 and provide significant protection to primary cardiomyocytes following an ischemia-reperfusion challenge, the initially designed prodrug exhibited relatively slow release kinetics due to the rate-limiting 1,6-elimination linker.

To increase the AA147 release kinetics and downstream protection of heart tissue, we have designed a series of new prodrugs, considering steric, electronic, and entropic impacts to increase the kinetics of therapeutic release and improve biological activity while maintaining stability. Functional groups such as carbonates have been added into the linker in order to increase the speed of release according to Le Chatelier's principle for example, while various alkyl groups have been added to the benzylic position to increase steric bulk around the hydrolytically labile carbonyl carbon and increase stability. Progress on these syntheses, their physiological stability, and their release kinetics upon peroxide administration as monitored via LCMS techniques as well as UV-VIS spectroscopic techniques will be discussed.

Funding Source: Beckman Foundation, Welch Foundation, National Science Foundation

Mammalian biodiversity and human impact in Acadia National Park, Maine

Thomas Bates*, Maggie Denison, Brittany L. Slabach

Support for the conservation of natural spaces has its foundation in the public's ability to access and use natural landscapes. Recreational use has direct and indirect effects on an area's ecology, altering organismal behavior, occupancy, and habitat. Park systems and natural areas are consistently working to balance protecting the lands they steward while offering recreational opportunities to the communities that support them. We are investigating the effect of recreational use, landscape ecology and management actions on mammalian biodiversity in Acadia National Park, ME. Our study site is Schoodic Peninsula, a 2366-acre parcel of land that includes a tract of land acquired in 2016 that was previously logged. Wildlife game cameras were placed in a grid approximately 700 meters apart, and on trails, to passively monitor human use and large mammal presence. Live trapping methods were used to monitor biodiversity at four sites that differed in habitat and landscape ecology. At our first site, over six trapping nights, we had 124 captures with 52 different individuals and five species resulting in a capture rate of 8.69% (124/1480). We did have a high recapture rate at 60.5% (46/76). While our study is on-going, our results do raise important questions regarding the effects of landscape ecology on small mammal communities.

Funding sources: Hixon Environmental Studies Fellowship, Second Century Stewardship Fellowship, National Park Service, Schoodic Institute

Isolated male and female rats demonstrate social conditioned place preference

Paige C. Bensing*, Blythe Iverson, Kah-Chung Leong

Investigation of how various factors influence social reward salience has many important implications for the understanding of general reward processes. Factors such as individual or group housing conditions, in particular, may modulate social reward and are particularly relevant given variability of social interactions across animals and humans. The present study highlights the effect of paired or isolated housing conditions on social reward preference using a social conditioned place preference (CPP) paradigm with Sprague Dawley rats. All male and female rats were assigned a same-sex, similar weight pair to be conditioned with throughout the study. In the individual housing condition, rats were single-housed for 2 weeks prior to and throughout the experimental paradigm. Rats in the paired housing condition were housed with their assigned pair at least 2 weeks prior to and throughout the experiment. On the first day of the CPP paradigm, all rats were individually placed in the CPP apparatus for 15 minutes with free access to two chambers with distinct visual cues to obtain a baseline preference of both chambers. Rats were conditioned over the next 8 days, in which rats were placed on alternating days into either the social-paired chamber with their conspecific pair or the other chamber, alone. On the 10th day of the paradigm, the rats' chamber preference was retested and a comparison to the baseline preference allowed for determination of whether there was a significant establishment of social place preference. Our results demonstrate that both male and female rats established a preference for the socially-paired context when housed in isolation but not when pair-housed. These findings suggest that the rewarding effects of social interaction are dependent on housing conditions, specifically that social isolation may increase the salience of social reward.

Funding Source: Murchison Fellowship

Prevalence and Impact of the Model Minority Stereotype on Asian American Students at Trinity University

Ollie Bowen*, Elaine Wong

Asian Americans have long been perceived under the model minority stereotype, which falsely depicts all Asian Americans as academically skilled, driven, family-oriented, and successful. Previous studies have shown that this label has detrimental effects on familial relationships and mental health. The model minority stereotype has also historically been used to oppress other minority groups in the U.S. through unfair and targeted comparisons. Through the use of grounded theory and a small focus group consisting of six Asian American students, this project gathers and analyzes information about the prevalence and impact of the model minority stereotype on Asian American students at Trinity University. It was found that though the model minority stereotype was less prevalent at Trinity, some participants felt the stereotype was more impactful while others felt it was less impactful. The students commonly felt expectations from the model minority stereotype as well as from Trinity's campus. Four coping methods were used by the participants: confronting the stereotype, conforming to the stereotype, passively accepting the stereotype, and finding positivity in their culture and identity. With this research, our understanding of the ways the model minority stereotype has influenced the Trinity Asian American community will further be uncovered, thus allowing us to better address their struggles and needs.

Understanding the Late Jurassic Nevadan Orogeny: Detrital Zircon Analysis of the Galice Formation, CA and OR

Emily Brodie*, Carter Nicol*, Kathleen Surpless

Despite decades of study, details of the complex tectonic history of the Late Jurassic Nevadan Orogeny in the Klamath Mountains Province remain unresolved. We present U-Pb and Hf analysis of detrital zircon from the Late Jurassic Galice Formation in the Western Klamath terrane. Because the Galice Formation was deposited during Nevadan deformation, Galice sediment provenance provides a possible test of competing tectonic models proposed for the Nevadan Orogeny. We will collect U-Pb age data from 300 detrital zircon grains isolated from each of eight samples that span the entire 250+ km strike-length of the Galice Formation to characterize sediment provenance. In addition, we will calculate maximum depositional ages based on the ages of the youngest zircon grains in each sample, which serve as a proxy for true depositional ages in this active convergent margin setting. Finally, we will measure the ϵ_{Hf} values in selected Mesozoic zircon grains to determine whether arc magmatism incorporated both continental and oceanic crust or only oceanic crust. Together, these detrital zircon data will allow us to assess provenance both along strike-length of the Galice Formation outcrops and throughout its depositional history, providing new constraints on tectonic models. In addition, our new data will help improve stratigraphic correlations within the Galice Formation and between the Galice Formation and other Upper Jurassic strata in the western U.S. We will analyze samples at the University of Arizona LaserChron Center in July and present our interpretations at the GSA Connects 2023 in October.

Funding Source: National Science Foundation

My Second Internship at The San Antonio African American Community Archive and Museum

Dakotah Brown*, Lauren Turek

During the summer, I had the privilege of interning again at the San Antonio African American Community Archive and Museum (SAAACAM). SAAACAM is a relatively new organization dedicated to collecting, preserving, and sharing the rich cultural heritage of African Americans in the San Antonio region. I applied for this internship through Trinity University's Arts, Letters, and Enterprise program, and fortunately, it was my third internship facilitated by this program; and my second summer internship at SAAACAM. This internship provided another incredible opportunity for me to continue to work with a nonprofit organization that specifically supports the black community in San Antonio. As an Anthropology major with a passion for public engagement and a minor in African American Studies, this internship was a perfect fit for me.

As a general intern at SAAACAM, I had the opportunity to undertake various assignments and contribute to multiple projects. These tasks included conducting research, revising existing research materials, managing administrative work, coordinating with volunteers, and handling various behind-the-scenes responsibilities within the organization, which operated with limited staff.

Throughout my time at SAAACAM, I honed and developed numerous skills. The organization fostered an environment where flexibility, collaboration, and passion were implicitly expected from everyone, and I thrived in such an atmosphere. Specifically, I worked closely with the Historian, assisting with research, collaborating with the Volunteer Coordinator on event planning, and supported the Program Director in ensuring the smooth functioning of the entire operation. This allowed me to enhance my collaboration skills and strengthen my ability to work independently and make informed decisions. I greatly appreciated the trust placed in me as an intern, as I was given the autonomy to complete tasks without constant supervision. Overall, this experience deepened my understanding of the demanding nature of running a nonprofit organization, particularly with a small team. Witnessing the transformative impact of hard work and dedication on building a well-respected and renowned institution was truly inspiring. My time at SAAACAM was an invaluable learning experience that contributed to my personal and professional growth. I will forever cherish the memories and knowledge gained during this internship, and I am sincerely grateful for the opportunity to be part of the SAAACAM community.

Funding Source: Arts, Letters, and Enterprise Program

Inexpensive Self-Aligning Interferometer

Reece Brown*, [Dennis Ugolini](#)

An interferometer uses the wavelength of light to measure tiny changes in distance. The purpose of this project is to produce an affordable self-aligning interferometer capable of producing fringes which will be used to measure the wavelength of unknown lasers with a precision of one angstrom. Which is designed to allow undergraduate students to have access to higher-level research opportunities with lower research budgets.

The system currently runs on an inexpensive Elegoo Mega 2560 microcontroller which is compatible with the Arduino IDE, allowing for the system to be coded and altered with a simplistic and straightforward version of C++. To achieve motorized control, the system employs 1000:1 Pololu motors along with H-bridge drivers and 3D-printed mounting instruments. By incorporating these components, the system facilitates the conversion of standard optical mirrors into motorized mirrors at an additional cost of \$60 beyond their standard price, compared to the average cost of \$1000 for motorized optical mirrors. To ensure proper alignment the system uses a quad-photodiode to identify the necessary adjustments required for the mirrors, and once all sections of the photodiode measure the same intensity this tells the system that the beam is perfectly aligned to the center of the photodiode.

Currently, using one mirror the system can align the beam to one specific spot, and with two mirrors, the system can split a single beam and properly align each split beam along a line using a quad-photodiode. By expanding the setup to incorporate more mirrors for enhanced control and proper interferometer geometry. We anticipate the system to split a laser beam and then properly superimpose the beam back together to cause the needed fringe patterns to eventually measure the wavelength of a laser.

Supramolecular Controlled Release

Connor Buchanan*, Sara Trauth, Adam Urbach

Protein drugs have seen a significant increase in FDA approval over the last decade, and there are currently more than 600 FDA approved biologics on the market. However, because proteins are broken down by the GI tract if ingested orally, biologics are delivered via injection, which causes patient discomfort and can lower compliance with treatment. Extended release formulation allows a drug to be released slowly over time, maintaining dosage in the therapeutic range, decreasing the number of doses that a patient must receive, and increasing patient compliance. Our lab seeks to develop an extended release system for proteins and small molecule drugs using the synthetic receptor, cucurbit[7]uril. This presentation will cover the design and synthesis of hydrogel materials containing Q7 and studies of the release of ligands from these materials.

Funding Source: National Institutes of Health, Welch Foundation, Research Corporation for Scientific Advancement, Trinity University

Interning with the Texas Heritage Project

Cierra Cadena*, Jennifer Mathews

The American Indians in Texas at the Spanish Colonial Missions (AIT-SCM) is a non-profit organization that works to preserve and protect the culture and traditions of the Tap Pilām Coahuiltecan Nation as well as the indigenous people from the regions of South Texas and Northeastern Mexico. The research, education and community outreach efforts of AITSCM have helped shape and strengthen the indigenous community of South-Central Texas despite opposing efforts to erase Indigenous history and their valuable contributions to society. Throughout my internship at AIT-SCM, I have conducted research on the location, traditions and culture of different tribes located throughout the state of Texas and northeastern Mexico before colonization, engaged in the process of creating a Land Acknowledgement, as well as have conducted oral histories for Urban Native women located in the south Texas area to discuss the importance and value of indigenous woman within society. AIT-SCM is planning to showcase the Urban Native women of the past and present in an exhibit at the Presidio during Women's History Month. Not only has my work at AIT helped expose and trace the histories of tribes that the broader Euro-American society has tried to make us forget/erase, but it has also empowered and lifted up the voices of many indigenous people while also heightening awareness about them and their value to society.

Funding Source: Donahue Award for Social Justice

Grant Writing and Fundraising in the World of Nonprofits

Giovanna Campolo*, [Benjamin Sosnaud](#)

The San Antonio AIDS Foundation (SAAF) takes a comprehensive approach to reducing new HIV and sexually transmitted infections by addressing structural concerns such as food insecurity, housing instability, access to affordable healthcare, stigma, and educational inequalities. An intersectional approach is essential in dealing with epidemics such as HIV/AIDS, where social phenomena such as wealth inequity and stigmatization combine to create devastating health disparities. Bexar County is considered to be an HIV ‘hotspot’ by the CDC for being an area of elevated disease burden or high transmission efficiency. HIV in San Antonio disproportionately affects Black and Latinx youth.

Because grants provide vital funds and support for non-profits, organizations often have to align themselves with grantmakers in order to continue their work. During my time at SAAF, I collected relevant data and created reference sheets for different grant applications and also searched for grants that could support specific projects. The task of summarizing your organization in a few hundred words and creating a sales pitch around a project can be arduous and at times detached from the organization's mission. Writing grants is like learning a new language, a skill that requires knowledge acquired through experience. Social and human capital can play a pivotal role in being funded, as many grantmakers prefer established and experienced non-profits. The language of the grantmaker usually needs to be matched by the grantee, regardless of its inclusivity. The ability of non-profits to meet the needs of the local communities they serve is shaped by their relationships with grantmakers.

Funding Source: Donahue Award for Social Justice

Animal Heroes and Children Activists: A Case Study of Animal Depictions and Archetypes in AI-Generated Stories

Cutter Canada*, [Althea Delwiche](#)

As large language models like ChatGPT are integrated into the homes of the public, questioning the generated content has become progressively more apparent. This research paper explores the archetypal narratives and depictions of animals across 320 stories generated by both ChatGPT3.5 and ChatGPT4 models. The study observes the interweavings of AI ethics, anthropomorphism, and children's literature. The primary research question asks in what ways does ChatGPT's storytelling algorithm depict animal characters, their behaviors, and interactions with other animals and humans?

This study reports findings from a quantitative content analysis of 320 AI-generated narratives from the ChatGPT3.5 and ChatGPT4 models, collected over two weeks. A codebook containing 19 variables under the categories *narrative traits*, *animal depiction*, and *human-animal relationships* was used to evaluate each story. Preliminary analysis reveals recurring themes of interspecies community and unity that permeate these AI-generated stories. The story tropes frequently depict anthropomorphic animals uniting for survival or humans learning to appreciate the human-animal relationship. The stories overall challenge anthropocentric views of human superiority, underlining an implicit, AI-mediated call for interspecies cooperation.

This paper argues that AI-created stories encourage the reader to reconsider anthropocentric views, fostering a richer understanding of the diverse experiences of non-human animal existence. However, the stories generated by ChatGPT, despite their idyllic depictions, are products of AI algorithms that neither possess a real-world understanding of animals nor reflect the multifaceted complexities of animal life, demonstrating the need to better incorporate animal ethics when training AI models.

Disney said gay: Employee activism, Governor Desantis, and the fight for LGBTQ+ rights

Claire Carpenter, Camille Reyes

This case study examines employee activists using public relations tactics in a cultural moment when companies now have the expectation to intervene in socio-political affairs. While previous studies have examined the role of public relations in/as activism, very few have considered the dynamics of using the persuasive power of public relations to create change from within an organization. The case at hand concerns employees of the Walt Disney Company staging a walkout to demand that the corporation take action against Florida HB1557, the so-called “Don’t Say Gay” act, or “Parental Rights in Education” bill in March of 2022. Through textual analysis and qualitative coding of an employee-generated Twitter account and website, we see how the employees framed their protest in a way that emphasized solidarity and positive LGBTQ+ representation while aiming to keep their jobs. The relative efficacy of these protests is also considered through the tracking of political donations to key Florida politicians, including Governor DeSantis, and an analysis of public statements issued by Disney. This case is emblematic of a wide range of recent employee activism movements related to similar “culture war” issues. In these battles, the profit motive and political expediency often clash with the social justice aims of employees who are subject to the rules of both corporations and the state. However, the traditional posture of the Republican party as “the friend of big business” has been subverted here with DeSantis and Disney engaged in rhetorical and legal struggles, all sparked by the employee protest. Are the battle lines being redrawn? This is not to make a generalization, but rather to use the case study as a way to understand the dynamics and tactics at play in what amounts to high-stakes concerns for marginalized communities in particular, and for democracy more broadly.

The DoSeum: Spreading Joy and Curiosity as Far as They Can Reach

Mia Carrasco*, Wilson Terrell

This summer I worked as a student intern for The DoSeum, the children's museum of San Antonio. Working in the outreach department, my internship involved educating and entertaining children at summer camps. The DoSeum aims to share their experience all over the greater San Antonio area; however, the outreach department seeks to operate in underserved communities. My academic interests in education and museum studies piqued, and my professional etiquette thoroughly developed through working for a non-profit focused on strengthening community and extending informal education to children and families all over the city.

At the DoSeum, my work consisted of both office and outreach tasks. If I wasn't working off site at a school or community center, I spent time developing new activities for events. As the DoSeum uses inquiry-based learning and the STEAM (Science, Technology, Engineering, Arts, Mathematics) model for education, both practices should be reflected in each activity. I created two activities, one based on star life cycles and the folklore surrounding constellations, and one based on homemade instruments and soundwaves. During outreach events, we worked in community centers with kids aged five to thirteen. Our activities were designed to excite and teach children, fostering both curiosity and creativity.

Working closely with children taught me improvisation, as low student engagement calls for last minute activity changes. Teamwork was also always necessary at outreach events— we taught upwards of thirty children at a time, and even when groups were small, I often had to break off for one-on-ones with emotional students. The DoSeum expanded my assumed career path; now, I have the confidence to step into an office or educational setting, and a nonprofit organization is now my ideal niche.

Analyzing Early Math Concepts and Teaching Strategies Employed in Children's Educational TV Shows

Ariana Castillo*, Maya Ozymy*, Vivian Spinks*, Rebecca Densley*

In this day and age, media is widely accessible to children. Although kids may consume content that is problematic, they also have opportunities to engage with educational media. This project seeks to analyze educational messages in media content to better understand children's math learning. Specifically, we coded for Kindergarten TEKS (Texas Essential Knowledge Skills) and a variety of teaching strategies used in the children's TV programs *NumberBlocks*, *Team Umizoomi*, and *Peg + Cat* to determine if the content will benefit children in their math learning. As a research team, we have worked to achieve inter-coder reliability, and have coded all existing episodes of *NumberBlocks*, and 26 randomly selected episodes of both *Team Umizoomi* and *Peg + Cat*. This project will set the stage to understand how these shows impact children in their early stages of math learning, and the effectiveness of the strategies used within the episodes to teach math concepts. The results of this project will have the ability to provide meaningful recommendations for parents, educators, and future children's media content creators.

Funding Source: Murchison Fellowship, Mellon Initiative

Asylum Cultures' Opinions on Refugees

Chloe Castro*, Mario Gonzalez-Fuentes

As the world continues to become increasingly globalized, understanding cultural differences is more important than ever. Globalization is especially impactful in countries that grant asylum to refugees such as Costa Rica, the United States, and Zambia. This research studied these asylum countries' attitudes toward refugees as well as their national pride, socioeconomic status (SES), and basic demographic information to see if there is a correlation between these traits and their country's psychological traits.

This research used the Attitudes Towards Refugees Scale (ATRS) to collect the participants' opinions on refugees. The Identity with and Desire to Maintain Culture (IDMC) and the Pride and Participation in Culture (PPC) scales were used to collect the participants' national prides. Each of the measurements was obtained through surveys and follow-up interviews in order to gather both quantitative and qualitative data. Each culture's psychological traits are Hofstede's Cultural Dimensions which is a well-known and standardized model.

It is anticipated that cultures where hierarchy is important, with high individualism, assertiveness, long-term orientation, and low indulgence will have negative attitudes toward refugees. It is also expected that cultures with high national pride will have more negative attitudes. Other factors such as demographic information and SES may correlate with their culture's ATRS score.

While there is sufficient psychological research behind immigration flows, these studies tend to only focus on Western, educated, industrialized, rich, and democratic societies. The outcomes of this research may provide a correlation between psychological traits and attitudes toward refugees. With this knowledge, more inclusive policies can be formed. However, this cannot be done with this research alone, but it is a step in the right direction.

Korean Language Acquisition with Korean Dramas

Rudy Castro*, Althea Delwiche

Korean culture is expanding into the west through K-Pop (BTS and Blackpink), Korean dramas (Squid Game and Business Proposal), and Korean movies (Parasite and The Roundup). According to Billboard magazine, the South Korean Singer, Jimin was the first soloist to top the US charts. Simultaneously, Duolingo, one of the biggest language learning apps, reports that Korean has been one of the fastest growing languages that its users have been learning, surpassing languages like Chinese, Russian, and Hindi. Korean dramas may have played a role in such a spike due to its ever growing popularity in the US, with Netflix recently investing \$2.5 billion in Korean media such as K-Dramas and films. This study asks Are Korean Dramas a viable supportive tool for language acquisition among young adults? and proposes a design for a pilot study to examine the effectiveness of these dramas. Visual media are commonly used to teach English and Spanish as a second language but there are few studies in regards to the acquisition of Korean language as a second language in the US with visual media. This paper reviews the literature related to the spread of Korean media worldwide, investigates other strategies for language acquisition, and assesses research on the role of visual media in language acquisition. Based on findings on the literature review, I propose a possible design of a small pilot study to test the effectiveness of Korean dramas as a vehicle for individual language learning. After receiving feedback from colleagues at the summer research symposium, I will revise the design and hope to conduct a small case study incorporating 8 to 12 Korean language learners at a local cultural center in San Antonio, the Korean American Cultural Center of San Antonio.

Beyond Pitches and Rhythms: Backstage at the Symphony

Jake Cipolla*, Carolyn True

Thanks to Trinity's Arts, Letters, and Enterprise (ALE) program, I had the opportunity to work for the Development Team at the San Antonio Philharmonic under Annette Paulin, Director of Development. The San Antonio Philharmonic is San Antonio's non-profit professional symphony which evolved, post COVID, with the goal of spreading classical music to all communities in and around the San Antonio area. This summer most of the development team's focus was on analyzing and finalizing the first season and identifying opportunities for the coming year.

Working as a development team intern, I worked with grants and reports along with delegated tasks for the upcoming season. I collected and analyzed data from concert attendance such as attendees locations. By evaluating this data, the Philharmonic can determine what audiences they are reaching and create strategies to connect with those communities with lower attendance.

I also had the opportunity to contribute to the Philharmonic's social media account in addition to being asked to create a new infographic highlighting achievements from the previous season with the statistics gathered from the work done this summer.

Through this internship I adapted to having to work remote most days, being a self-starter, managing deadlines while learning new software. The experience I had working with Microsoft Office tools like Excel, and Little Green Light, a donor management software built for non-profit organizations to manage fundraising and donors, will definitely benefit me in future jobs.

Overall this internship helped me to learn what occurs within a nonprofit organization, supported the goal of the organization, established groundwork for new skills, and intensified the skills I already had.

Funding Source: Arts, Letters, and Enterprise Program

Fluorogenic ATRP as a Novel Polymerization Kinetic Assay

Nicholas Cipolla*, Isabela Castillo*, Gianna Garza*, Christina Cooley

Carefully controlled reaction kinetics, and thus polymer properties such as molecular weight and degree of polymerization, are critical to designed polymer applications, and reactions which are able to control and optimize for these characteristics are becoming increasingly important. Current methods to reliably and carefully monitor polymerization characteristics involve highly specialized, costly, and low-throughput instrumentation which all sacrifice the ability to monitor reaction kinetics in real-time. As an alternative to these complex and expensive setups, we propose the use of fluorogenic atom transfer radical polymerization (ATRP) as a simple and accessible method for the direct monitoring of polymerization kinetics.

The Cooley Lab has previously demonstrated that a fluorogenic monomer probe (anthracene methacrylamide, AnMA) will reveal fluorescence upon copolymerization with another monomer, even at low AnMA concentrations. The trace incorporation of AnMA into the preexisting reaction allows for this method to act as a non-invasive technique to monitor degree of polymerization (DP) and polymer molecular weight. By incorporating AnMA into a panel of common ATRP monomers, we are working to establish the relationship between observed fluorescence and DP.

A drawback of ATRP is that it requires rigorous oxygen scrubbing which is inefficient and limits throughput. To combat this, we propose chemical modifications to the procedure to allow for an oxygen-tolerant polymerization. We are also testing a variety of monomers for oxygen-tolerant ATRP.

By taking samples at time points throughout the reaction, DP and molecular weight data can be examined in tandem with fluorescence readouts. These experiments will allow for a comprehensive understanding of how fluorescence corresponds to monomer DP throughout the polymerization. Through these studies, we will seek to define parameters to convert observable fluorescence to DP for common ATRP monomers, allowing for analysis of polymerization kinetics with inexpensive, readily available equipment in real-time.

Funding Sources: Welch Foundation, National Science Foundation, Beckman Foundation

To stay or go: Can weakling nestlings beat the odds by leaving home early?

Ian Crain*, **Uriel Eddy***, **Madelyn Holveck***, **Josephine Mitchell***, **Olivia Saari***, **Anna Sotiriades***, Troy G. Murphy

Sibling rivalry is prevalent across taxa. Among fast-growing altricial birds, asymmetries in competitive ability can lead to extreme differences in size and health across nestlings. The least competitive nestlings (weaklings) may simply be out of luck and represent a genetic dead-end. However, weaklings may have evolved an alternative tactic to increase their competitive success. We hypothesize that weaklings will fledge earlier than their more competitive siblings, placing themselves in a position outside of the nest where they can intercept food that parents are delivering. The Black-crested Titmouse, *Baeolophus aricristatus*, is a songbird that nests in tree cavities and artificial nest boxes. In this species, nestling size within a brood is highly variable, as is the date of fledging. We examined the effects of body size and health (mass per size), on fledging order within the species. We predicted that the nestlings that are struggling to compete for access to food (the smallest and least healthy) will be the first to fledge. Research was carried out at the Bracken Bat Cave Preserve, north of San Antonio, Texas. We measured mass and body sizes (tarsus length) from each nestling from 20 nest boxes. We established fledging order by placing a PIT (passive integrated transponder) ankle band on each nestling and recording fledging (departure from the nest) with an RFID (radio frequency identification) antenna placed around the nest box entrance. Analyses are underway. By investigating the relationship between fledging order and a nestling's size and health, we will learn if weaklings benefit by removing themselves from a highly competitive environment. Such findings would support the hypothesis that amongst the weakest, evolution may favor alternative competitive tactics.

Funding Source: Texas Ecolab, Biology Summer Undergraduate Research Fellowship, Hixon, ACRC

Creation of a novel technique for breaking long range neural circuits

Alice Dang*, Manisha Saraswathi*, Gary Sun, Amanda Flanagan, Madison Horn, John Clark, Evan Farrell, Cole Williams, Jullian Valadez, and Gerard M.J. Beaudoin III

There are a number of methods used to study synapses through selective labeling and control. However, these techniques are often cytotoxic, difficult to implement, or lack the selectivity required to most effectively study microcircuits. To selectively destroy synapses, we have developed a chimeric protein, CadPlexin, that will activate repulsion signals through homophilic binding between two cells connected by a synapse. CadPlexin is composed of the extracellular domain of fruit fly (*D. melanogaster*) DE-Cadherin and the transmembrane and intracellular domains of mouse (*M. musculus*) Plexin-B2. Cadherins are proteins that mediate cell-cell adhesion through homophilic binding. Plexins are signaling proteins that when dimerized and activated by their usual ligand, Semaphorin, will cause a downstream signaling cascade that elicits neuronal repulsion signals through cytoskeletal regulation. We hypothesize that when two cells expressing CadPlexin are in close contact (i.e. at a synapse), CadPlexin will selectively destroy the synapse, as the extracellular domains from DE-Cadherin will bind and mimic semaphorin binding and clustering required to activate plexin signaling that induces repulsion. Our results from *in vitro* experiments suggest that CadPlexin performs as expected, seen through creation of stress fibers in the actin cytoskeleton of Cos7 cells transfected with CadPlexin – a characteristic cytoskeletal change induced through Plexin signaling. In future work, we will test this protein in primary culture neurons. Together, this technique will allow us to destroy synapses with surgical precision by targeting synapses between some neurons while leaving other synapses intact.

Funding Sources: Voelcker Summer Research Fellowship, Trinity University Start-Up Funds, The Brain and Behavior Research Foundation, Groff Foundation, McNair Scholars Program, Trinity University Women in STEM Program

Conmemorando a la Comunidad: Latinx Experiences at Trinity

Lee Denney*, Seb Mora*, Dania Abreu-Torres, & Abra Schnur

The main goal of this project is to record oral histories and gather archival information in order to create a digital exhibit about the Latinx community at Trinity University. More granularly, this project seeks to determine how the Latinx community has been involved in the Trinity community and the San Antonio community, as well as how the Latinx community's involvement has changed throughout history. In addition, with our project we hope to allow Latinx alumni and current students to feel more connected to the Trinity community and to understand the historical connections between Trinity and the San Antonio community. Throughout the summer, we have researched and created a handful of exhibits; one focused on student organizations, another on study abroad programs, and another on interdisciplinary programs. This was made possible through archival research, as well as the oral history interviews we conducted.

Construction of an inducible GFP plasmid to study motility dynamics in *Pseudomonas aeruginosa* and *Escherichia coli*

Mahika Desai*, Nicola Ferguson*, Jordan Ha*, Frank Healy

To obtain information on the motility of *Pseudomonas aeruginosa* and *Escherichia coli* cells, green fluorescent protein (GFP) is used to visualize bacterial cells. In previous experiments, a dark region was observed within bacterial cells. Presumed to be the nucleoid, this structure confers an asymmetry to cell visualization and can provide more information on motility dynamics of bacterial cells. To utilize these structures and gain information on rotation speeds, an ideal level of bacterial fluorescence needs to be achieved such that the structure is visible without oversaturation of bacterial cells from high fluorescence levels. To reach this level of fluorescence, GFP production in bacterial cells must be further controlled. One method used to control GFP production is to subject the expression of the sfGFP gene to an inducible system such as the rhamnose inducible promoter encoded in the pJM220 plasmid. By integrating the sfGFP gene into this system, various concentrations of rhamnose will correlate to higher or lower expression of the sfGFP gene and production of GFP in bacterial cells. Thus, a specific concentration of rhamnose can be introduced to achieve an optimal level of sfGFP expression enabling clear observation of bacterial cells without resulting in over fluorescence and reduced detectability of the structure. To form the plasmid construct, PCR and gel electrophoresis experiments were performed to confirm amplification of the sfGFP gene. After this, the sfGFP gene was integrated into the pJM220 plasmid. Plasmids containing the sfGFP gene within the rhamnose system will be introduced to bacteria and tested in various rhamnose concentrations. Determining the rhamnose concentration needed to visualize the dark structure will provide more information about rotation speeds, which can be further analyzed to better understand the movement and motility of *P. aeruginosa* and *E. coli* cells.

Optimizing the placement of fluorescent molecules above gold nanogratings for the enhancement of FRET

Katherine Dixon*, Nathan Warpmaeker*, John McMahon, Jennifer Steele

Our ultimate goal in this study is to enhance the rate of energy transfer in Förster resonance energy transfer (FRET) donor and acceptor fluorescence molecules using gold nanogratings. Since metal enhanced fluorescence (MEF) has been well documented for individual fluorescent molecules, we fabricated gold nanogratings with surface plasmon excitations in the visible range to apply MEF to FRET-paired fluorescent molecules. Cy3 and Cy5 were chosen as the donor and acceptor fluorescent molecules, respectively. Previous research inconclusively showed a smaller than expected enhancement of fluorescence for Cy3 placed on DNA 20 base pairs in length above the grating with the molecule situated such that the dipole moment was parallel to the surface. To optimize FRET, we wanted to measure the fluorescence enhancement of Cy3 molecules placed at different distances above the gold nanogratings. Specifically, the Cy3 molecules were positioned 10 base pairs (3.4 nm), 20 base pairs (6.8 nm), and 30 base pairs (10.2 nm) away from the grating. However, our initial attempts did not yield the expected results, leading us to question whether the precise orientation of the Cy3 molecule or other unidentified factors were influencing the outcome. It is possible that a very specific distance or additional variables need to be considered for successful enhancement. In future studies, we will continue investigating these factors to shed light on the optimal conditions and advance our understanding of fluorescence enhancement.

Investigating Novel Fig4 Binding Partners with Potential Implications to Neurodegenerative Diseases

Lauren Dotson*, **Alex Rodriguez***, **Imran Khan**, **Hannah Reeves**, **Harrison Hall**, Bethany Strunk

Fig4 is a lipid phosphatase required for regulating cycles of phosphorylation and dephosphorylation of its lipid substrate, PI3,5P2, in eukaryotes from yeast to humans. Fig4 is known to perform this critical cellular role through interacting with the protein complex: Vac14-Fab1-Fig4. Mutations in Fig4 that cause its dissociation from the Vac14-Fab1-Fig4 complex lead to dysregulation of PI3,5P2. Importantly, these mutations have been implicated in demyelinating neurodegenerative diseases including CMT4J and ALS in humans. These diseases have been primarily attributed to the dysregulation of PI3,5P2. Unexpectedly, the expression of the corresponding Fig4 mutants in yeast cells leads to a growth advantage compared to wild type under specific stress conditions. The growth advantage conferred by these mutants cannot be simply a result of the loss of Fig4 function because the growth advantage is not observed in the total absence of Fig4. We propose that when Fig4 is dissociated from its known complex, it is available to bind with an unknown protein to promote growth under these conditions. We will identify novel Fig4 binding partners that may be mediating this growth advantage using a yeast two-hybrid assay. We will use a Fig4 disease-related mutant as “bait” for potential binding partners by fusing it to a DNA binding domain thereby recruiting Fig4 to the promoter region of a gene that allows survival under selective conditions when expressed. Transcription of this gene will only take place if the DNA bound Fig4 interacts with a “prey” protein fused to a transcription activating domain. We will generate a library of “prey” constructs using cDNA from RNA expressed under the conditions where the growth advantage is conferred. Identification of the proteins or proteins mediating this growth advantage may lead to new understanding of the different ways Fig4 mutants contribute to cell homeostasis and perhaps human disease.

Funding Source: Voelcker Foundation

Busting Open a San Antonio Time Capsule

Jordan Dozier*, **Cierra Cadena**, **Calvin Taylor**, Alfred Montoya

Throughout the course of this summer, I was granted the opportunity to work with the nonprofit American Indians in Texas with the Spanish Colonial Missions (AIT-SCM). I was specifically working within the Texas Heritage Project (THP) branch of AIT-SCM. AIT-SCM as a nonprofit encompasses a large number of programs with a goal to meet the social and cultural needs of those within indigenous communities in and around San Antonio. The THP uniquely conducts primary research of family artifacts and historical records to present the narrative of indigenous communities in South-Central Texas to reverse systemic erasure of indigenous history.

As an intern for AIT-SCM within the THP, I have scanned historical documents and sources in order to add such to the THP's digital repository. Alongside my fellow interns, we each have created exhibits for the THP to use at locations such as the Witte Museum. I have conducted off-site interviews with those within indigenous communities, and have later transcribed the interviews in order to add to the digital repository. Moreover, I have learned the format and creation of land acknowledgements, assisted with the production of recorded oral history segments, and conducted primary research as needed.

Throughout my internship, I have gained an understanding of the historical richness of San Antonio and its people. Working so closely with the Tap-Pilam Coahuiltecan Nation has provided me with insight into the difficulties that indigenous communities face in our status quo, alongside the intricate tribal politics that I was previously unaware of. This poster will display the various assigned tasks completed at AIT-SCM with a focus on the exhibits that me and my fellow interns have worked on throughout the summer. It will encapsulate both the career-oriented skills we acquired alongside the cultural understanding we felt we all gained.

Evaluating the Effect of Truncations to the U5-snRNP Protein Dib1

Richard Dunn*, Corina Maeder

Pre-messenger RNA (pre-mRNA) splicing involves the excision of non-coding DNA and the ligation of coding DNA to produce mature mRNA. This catalytic event is facilitated by the spliceosome, a highly dynamic, multi-megadalton ribonucleoprotein complex. In *S. cerevisiae*, Dib1, a 143 amino acid protein, resides at the catalytic core of the spliceosome. Dib1 is present in the pre-catalytic spliceosome but absent in the catalytically active spliceosome. The loss of Dib1 during spliceosomal activation hints at Dib1's potential role in allowing conformational changes to occur. Previous work has demonstrated autocleavage activity of Dib1's C-terminus. The cleavage of Dib1's C-terminus may prompt its departure from the splicing machinery. However, the role that the C-terminus has on splicing remains uncharacterized. We are interested in determining whether the C-terminus affects Dib1 stability and splicing.

To investigate Dib1's C-terminus in relation to splicing, truncations to Dib1 were constructed and assessed by growth, splicing, and structural assays. For C-terminal truncations, wild-type and truncated Dib1 proteins were purified and their stabilities were assessed. The stability was determined using circular dichroism spectroscopy under increasing denaturing conditions. Growth assays and in vitro splicing reactions were performed to observe the effects on cellular function and splicing. Our work shows that Dib1 tolerates a loss of 5 kJ/mol with 14 residues off the C-terminus, but additional truncations result in greater instability. To further explore the importance of residue identity, alanine mutations were introduced. Dib1's stability appears to be directly linked to the length of the C-terminus, and we speculate that the C-terminus is critical for stabilization of the spliceosomal complex. The C-terminal tail may play a direct role in splicing or act as a molecular switch to destabilize Dib1 for departure from the splicing complex.

Funding Source: Trinity University Chemistry Department, Welch Foundation, Voelcker Foundation.

Assessing Geothermal Potential Using 3D Modeling and Restoration of the Sevier Fault System, Southern Utah

Demi Durham*, Benjamin Surpless

Important decisions about geothermal energy production rely on fluid flow within the subsurface. As faults form and propagate, they fracture rock around them, increasing permeability and affecting fluid flow in the subsurface. An accurate analysis of the geometry of a fault system can provide information about fracture formation and fluid flow interactions. The west-dipping Sevier normal fault zone near Orderville, Utah is a complex, segmented system located in the transition zone between the highly-extended Basin and Range Province and the relatively stable Colorado Plateau. We analyzed published cross-sections of the Sevier fault zone by constructing a 3D model, thus permitting us to assess geothermal potential.

We used the Move2020 modeling suite (by *Petex*) to produce a model of the Sevier fault network. We also utilized ArcGIS to georeference digital geologic maps and a 10-meter digital elevation model. By combining these data with cross-section interpretations and merged orthographic images, we attempted to build a digital fault network with horizon interpretations. However, we identified inconsistencies in cross-section interpretations based on misaligned unit horizons and fault surfaces, so we revised these cross sections to create a more accurate depiction of the Sevier system. We will continue to analyze fault geometries in order to build the most accurate model possible. When the 3D model is internally consistent, we can restore deformation to reveal the system's long-term evolution. With a better understanding of these geometries, other researchers and power utilities can effectively target sites in the subsurface with high geothermal potential.

Funding Source: National Science Foundation

Digital Extenders Project: An Evaluation of Force Feedback in Referred Haptic Feedback

Dawson Durr*, R.L. Hood, Emma Treadway

The Digital Extenders (DE) is a medical device designed at UTSA by Dr. R.L. Hood's team to provide a safer alternative to digital intubation. The DE acts as a wearable haptic device which goes on the user's hand like a glove. Digital intubation is a medical procedure performed by emergency responders to open up a patient's airways using a breathing tube that is positioned with their fingers. The current method of digital intubation poses safety threats to both the patient and doctor, which we hope to eliminate with the implementation of digital extenders.

Through the research this summer, we evaluated the DE's current haptic feedback which refers force to the user through a vibrotactile interface. To test the effectiveness of the force feedback, we ran a set of experiments on ten participants. The experiments consisted of two trials: one with just the DE without the vibrotactile force feedback and one with the vibrotactile force feedback. In the experiments, participants were asked to press down on a variety of randomly selected foam blocks with the DE and distinguish which stiffness they were feeling. We found that the addition of force feedback did not significantly improve participants' ability to distinguish between stiffnesses in the experiments.

Based on these results, we believe that an alternative form of haptic feedback is necessary to improve the performance of the DE for its users. One particular method that we are looking into is implementing vibrations sensors to the DE which can relay surface friction in the form of vibrations on the participant's fingertip. We plan to test these vibration sensors with the force feedback in our future work.

Structural and Functional Characterization of Yeast Splicing Protein Dib1

Richard Dunn*, Bryce Dye*, Jessica DuVon*, Corina Maeder

Pre-messenger RNA splicing involves the excision of non-coding DNA and the ligation of coding DNA to produce mature mRNA. This process is facilitated by the spliceosome, a multi-megadalton ribonucleoprotein complex. In *S. cerevisiae*, Dib1, a 143 amino acid protein, resides at the catalytic core of the spliceosome and departs in the transition from the pre-catalytic spliceosome to the catalytically active spliceosome. Dib1's departure is crucial for spliceosomal activation. Previous work has demonstrated self-cleavage of Dib1's C-terminus. However, the role that Dib1's C-terminus has on splicing remains uncharacterized. Additionally, Dib1's location within the spliceosome suggests the N-terminus interacts with other proteins critical to the formation of the catalytically active spliceosome. Therefore, truncated versions of Dib1's N-terminus may interfere with splicing events.

To investigate Dib1's termini in relation to splicing, truncations to Dib1 were constructed and assessed by growth, splicing, and structural assays. For C-terminal truncations, wild-type and truncated Dib1 proteins were purified and their stabilities were assessed. The stability was determined using circular dichroism spectroscopy under increasing denaturing conditions. Growth assays and in vitro splicing reactions were performed to observe the effects on cellular function and splicing. Our work shows that Dib1 tolerates a loss of 5 kJ/mol with 14 residues off the C-terminus, but additional truncations result in greater instability. To further explore the importance of residue identity, alanine mutations at residues 128 and 129 were introduced. Dib1's stability is linked to the length of the C-terminus and we speculate that the C-terminus is critical for stabilization of the spliceosomal complex. Moreover, we determined that deletion of 10 residues from the N-terminus of Dib1 is inviable in yeast. Yeast transformations containing truncations of 7 and 8 residues from the N-terminus were performed to analyze for temperature sensitivity. Thus, we are exploring whether the N-terminus is essential for Dib1 function.

Funding Source: Trinity University Chemistry Department, Welch Foundation, Voelcker Foundation

Spend a Day in My Genes

Kiran Esani*, Maranda Larsen

This summer, I had the opportunity to intern at the Chromosome 18 Registry & Research Society as the Camp Special Projects Intern. My role consisted of planning and organizing Camp, an annual family summit, however, my experience went beyond the job description and into the inner workings of how a non-profit functions. Furthermore, my technological capabilities were challenged and strengthened in this virtual internship. Chromosome 18 is a local non-profit that unites families who have family members with chromosome 18 abnormalities. In addition to the registry, Chromosome 18 has a research center that helps find treatments and spread knowledge about chromosome 18. Chromosome 18 allowed me to learn more about various genetic disorders and provided me with different career paths I had not previously considered.

As a Camp Special Projects intern, I helped create essential documents, including presentations, emergency action plans, and surveys. Additionally, I was tasked with organizing the silent auction that would occur at Camp. I was honored to help create the schedule for the event and reach out to speakers to get information necessary for Camp. However, my role was not only limited to Camp. I also researched various platforms to update Chromosome 18's messaging and fundraising platforms.

Throughout this remote experience, I developed technological skills in platforms such as Constant Contact, Canva, Excel, and Dropbox. I was given insight into how a non-profit works by sitting in meetings with senior members. Chromosome 18 has a research and a registry branch, and I was able to learn about grant writing used to fund the research center. Additionally, I got first-hand experience in how to plan a large event as a non-profit and improvise on a budget.

Cucurbit[8]uril Pair Inclusion Motif

Marc Ewe*, Adam R. Urbach

Cucurbit[8]uril (Q8) is a synthetic receptor with the ability to bind simultaneously to two ligands. NMR experiments have shown that Q8 can bind to a pair of neighboring amino acid residues from one peptide, which has been dubbed the pair-inclusion motif. Despite extensive NMR and thermodynamic evidence for binding in this motif, the molecular basis for recognition has yet to be firmly established. This presentation will describe our recent studies of structure-function relationships.

Toward an Insulin Analogue with High Affinity for Cucurbit[8]uril

Taylor Fate*, Adam R. Urbach

Optimizing the administration of insulin for the treatment of diabetes is problematic due to the inability to account for differences in insulin absorption rates. A method for monitoring blood insulin in real time would address this problem but does not yet exist. We have recently reported the modification of insulin to enhance its affinity for the synthetic receptor cucurbit[7]uril, but the binding affinity is still too weak to enable insulin detection at physiologic concentrations. This presentation will describe recent efforts to develop an insulin analogue with high affinity for cucurbit[8]uril.

A Directed Evolution Approach to Understanding Structural and Functional Features of Bacterial Stators

Nicola Ferguson*, Mahika Desai, Jordan Ha, Frank Healy

Swimming is critical for many bacteria to find nutrients and avoid hazards. Bacteria swim using flagella, which rotate when transmembrane complexes called stators provide torque to a motor at the base of the flagellum. Many bacteria use MotAB stators, consisting of five MotA chains surrounding two MotB chains. MotAB is thought to rotate when a proton binds to MotB, allowing MotA to slide clockwise around MotB. However, this mechanism and the interaction between MotA and MotB remain poorly understood. To better understand the structure and function of stators, we are studying *Pseudomonas aeruginosa*, which has a MotAB stator as well as an analogous MotCD stator. We will create less efficient chimeric MotAD and MotCB stators, and use directed evolution studies to understand the interactions between MotA and MotB, or MotC and MotD. To achieve this, we used PCR to amplify each stator gene, and linked them together into plasmids. These plasmids, containing MotAD or MotCB genes, will then be transformed into bacteria lacking stators, and the chimeric stator genes will integrate into the chromosome via homologous recombination. We will use soft agar assays to identify bacteria with phenotypic differences in their swimming ability, and sequence their stator genes to determine which mutations occurred to affect swimming. We will then compare these mutations to alignments and models of different stators to determine what structural impact the mutations had. In this way, we will better understand how stators' subunits and amino acids interact to affect swimming. In the future, we plan to extend our work to include heterologous chimeric stators, including stators from different species and stators that use sodium ions instead of protons as their energy source.

The garden study of UV-B absorbing pigments in two dicot species

Alessandra Finol*, James Shinkle

The effects of ultraviolet B radiation (UV-B) on cucumber (*Cucumis sativus* L.) and *Arabidopsis Thaliana* seedlings has been studied by the Shinkle lab. When crude extracts of UV absorbing pigments were analyzed spectrophotometrically, treatments of seedlings with Full Spectrum-UVB (FS-UVB, 270-340 nm) radiation and Long Wavelength-UVB (LW-UVB, 300-340nm) radiation resulted in spectra with features specific to the UVB treatment including differences in quantitative absorbance and presence or absence of peaks at different wavelengths. We aim to replicate and extend these findings and optimize conditions to produce the maximum differences between pigment extracts from FS-UVB and LW-UVB treated plants. We are testing multiple genetic strains of cucumber and *Arabidopsis*, determining the optimum time between irradiation and pigment extraction, and the optimum UVB exposure. We grew seedlings under dim red light ($0.2 \mu\text{mol m}^{-2} \text{sec}^{-1}$) and used brief (1–100 min) irradiations with ultraviolet-B (UV-B) wavebands. We extract pigments from cucumber and *Arabidopsis* hypocotyls in methanol/1% HCl extracts. We take spectra from 250–400 nm. Preliminary results confirm that tissue extracts taken 24 h after irradiation showed an overall increase in absorption and peaks at ~260nm and ~320nm for both types of irradiation, in contrast to previous findings where only FS UVB induced a peak at ~260 nm. An early breakthrough was discovered; we had the wrong filter for the LW-UVB. With the correct filter we were able to replicate the earlier findings with 3 cultivars, and one cultivar, BoothbyBlonde, exhibited the largest difference between the FS-UVB and LW-UVB at 260 nm, indicating that there is a unique pigment worth researching. We have not been able to replicate the results with the Columbia strain of *Arabidopsis*, but we plan run the trials with two other strains.

Human Entanglement and Jeff VanderMeer's *Southern Reach Trilogy*

Laura FitzSimon*, Heather Sullivan

In this environmental humanities project, I look at *The Southern Reach Trilogy* by Jeff VanderMeer and its themes of human transformation and entanglement in the environment. My work connects with Dr. Heather Sullivan's book project, *The Dark Green: Plants, People, Power*, but focuses on the multi-species relationships and human entanglement in VanderMeer's novels—*Annihilation*, *Authority*, and *Acceptance*. I argue that the total physical transformations of human characters by nonhuman organisms in the novels illustrate human entanglement in the environment; VanderMeer makes our connections to and dependency on nonhuman species visually blatant in the novels through the transformation of human bodies into wild hybrids of altered forms. Current concepts of bodily entanglements arise from contemporary science, new environmental thought, and ancient and indigenous cultures that point towards the interconnectedness of organisms. This understanding is in contrast to the prevailing idea of separation in industrialized cultures, that somehow humans are outside of the environment that they inhabit. The living world is built upon the connections between different organisms. Plants and fungi form and rely on relationships with each other to exchange energy and nutrients. Other fungal species infect insects so that they are able to disperse their spores. Our own bodies are supported by a multitude of microbes that help us break down food and protect us from illnesses that enter our bodies. Without these connections and relationships, there would be no multicellular life on Earth. VanderMeer's *Southern Reach Trilogy* acts as a thought experiment about such entanglements by pushing human-nonhuman relationships into extreme new form and making visible the very ecological interactions we often overlook.

Differentiation of HT22 Cells Leads to Reduced Cell Cycle Progression and Increased Cell Death

Amanda Flanagan*, Alice Dang*, Gary Sun, Manisha Saraswathi, Evan Farrell, John Clark, Madison Horn, Jullian Valadez, Cole Williams, Gerard M.J. Beaudoin III

HT22 cells, an immortalized mouse hippocampal cell line, is frequently employed by *in vitro* models in research fields including biology, neurotoxicity, and neuroprotection. Numerous studies have utilized HT22 cells assuming their functionality parallels that of primary cultured neurons, yet this assumption is likely to be flawed. Due to their immortalized nature, HT22 cells exhibit distinct characteristics compared to hippocampal cells obtained in primary cultures. One issue is that HT22 cells lack many of the characteristics of a primary cultured neuron, including cessation of cell cycle progression. Due to their immortalized nature, they are not mitotically arrested which could interfere with the functionality of certain constructs designed for normal neurons. Furthermore, because they do not regularly undergo apoptosis or normal cellular senescence, they could provide inaccurate results in regards to the cytotoxicity of different constructs. We attempted to enhance the neuronal characteristics of HT22 cells by removing sera and switching the media to one that supports primary neuronal cultures using one of two different supplements (N2 and B27), in addition to nerve growth factor and retinoic acid. These media supplements appear to enhance activity of a late stage differentiation promoter, CaMKII, assessed via the expression of green fluorescent protein (GFP). Additionally, these media decrease cell cycle progression and increase apoptosis/necrosis levels as quantified using flow cytometry. Interestingly, cell death is partially reduced by addition of retinoic acid. Overall, our research suggests that HT22 cells differentiated with B27 with additional RA best supports survival and differentiation of HT22 cells.

Funding Sources: Biology Summer Undergraduate Research Fellowship, Voelcker Foundation, Trinity University Start-Up Funds, Brain and Behavior Research Foundation, Groff Foundation, McNair Scholars, Trinity University Women in STEM Program

How Do Ethnic Identity and Microaggressions Predict Moment-to-Moment Emotion and Self-Concept?

Mason Fraser*, William Ellison

Microaggressions are brief and commonplace indignities - verbal, behavioral, or environmental - directed at people who belong to racial or ethnic minority groups. These experiences are not necessarily 'micro' when it comes to the amount of harm they impose on their target, as they have been associated with mental health problems like depression, trauma, anxiety, and stress for minority individuals in the U.S. However, the processes through which microaggressions relate to negative outcomes, as well as the roles of ethnic identification and self-concept in these processes, are inadequately understood. In the current study, we explored ethnic identification (both *exploration* of one's ethnic identity and the sense of *belonging* or *commitment* to one's ethnic identity/group) and self-concept clarity (the extent to which one's self-concept is coherent, consistent, and stable) as they related to the day-to-day experiences of microaggressions among members of racial and ethnic minority groups in the U.S.

Participants ($N = 65$) completed a measure of ethnic identification before using their smartphones to report on their daily experiences of microaggressions and their moment-to-moment self-concept clarity (SCC) and emotional experiences for two weeks. Hierarchical multiple regression was used to model connections among microaggressions, ethnic identity, negative affect, and self concept clarity. As expected, those who experienced more microaggressions had more negative affect over the study period. Those with high levels of ethnic identity exploration who experienced more microaggressions reported higher SCC during the two weeks, which was not true of other participants. One potential explanation is that experiencing microaggressions affirms the self-concept of those who are already exploring their ethnic identity. Another possibility is that identifying strongly with a minority racial/ethnic group and also having a reliably clear sense of self leads people to recognize race-based slights more often.

Funding Source: Murchison Fellowship

Mechanical Improvements to the Autonomous Planetary Rover

Robert Furuya*, Kevin Nickels

An autonomous planetary rover has been an ongoing project in Trinity's Engineering Science Department for three years and counting. The rover project is guided by Dr. Kevin Nickels, who plans to use it as a platform for future interdisciplinary remote-sensing geology research. Current research is sponsored by the Semmes Foundation, and previous supporters have included the Engineering Science Department (Senior Design) and the McNair Scholars program. Next year's senior design team aims to focus on software and navigation, so necessary improvements to the mechanical and structural soundness of the rover this summer will help them target their efforts.

Significant structural instability is apparent - the rocker-bogie suspension system twists concerningly under minimal load. Preliminary tests identified the rocker linkages (long, unsupported bars of aluminum extrusion) and plastic center connectors as primary sources of the torsional instability. These, and any other weak points, should be redesigned and/or refabricated with stronger materials.

In addition, worm gears will be investigated to supplement or replace the current cycloidal gearboxes and timing belts driving the rover. Previous testing found that the belts could not be tightened enough to avoid slippage without affecting structural integrity, especially on uneven terrain. A compact, high-torque - and most importantly - reliable solution is necessary.

This summer's efforts will focus on mechanical design and prototyping of upgraded systems. If time permits, production and installation on the rover will begin.

A Palette of Possibilities: A Reflection on My Internship at the San Antonio Museum of Art

Erin Galvin*, Jacob K. Tingle

This summer, I had the pleasure of interning with the San Antonio Museum of Art on the marketing and communications team. The San Antonio Museum of Art (SAMA) is a vital institution in the community that strives to foster appreciation and understanding of the arts—historical and contemporary—from around the world. Throughout my ALE summer internship at SAMA, I had the opportunity to enhance my professional skills and gain greater insight into communications both within a nonprofit and broadly. This experience solidified my love for the arts and interest in pursuing a career in public relations in a related field.

In the era of digital media, museums worldwide face the exciting challenge of showcasing their collections and captivating audiences in new and innovative ways. Amidst this dynamic landscape, I had the privilege of gaining invaluable insight into the various strategies employed by the Museum's marketing team. From developing social media content to writing copy, I learned to navigate the complexities of Museum marketing. As the only full-time intern in the department, I worked closely with the PR & Digital Communications Manager, Adriana, and the Chief Engagement Officer, Tatiana, to find new ways to foster deeper connections between art and the community. I utilized my experience with video editing and design to help generate content for the Museum's social media platforms. I also grew significantly more confident in my writing skills, completing various pieces for the Museum's social media channels, blog, and press releases. My time at SAMA has been extremely enriching and opened my eyes to the power of marketing and communications at nonprofit institutions. Through this internship, I have not only enhanced my professional skills but strengthened my passion for art and all institutions involved in preserving and promoting it.

Funding Source: Arts, Letters, and Enterprise program

Calibration of the method of images for regularized Stokeslets using sphere motion near a boundary

Amelia Gibbs*, Hoa Nguyen, Bruce Rodenborn, Orrin Shindell, Frank Healy

Many numerical simulations in fluid dynamics require modeling a sphere in motion near a boundary. In Stokes flow, the method of images for regularized Stokeslets (MIRS) has been widely used and validated with theoretical results for the rotational and translational motions of spheres parallel or perpendicular to a boundary, respectively. Our work, taking into account all possible motions of a unit sphere, presents a systematic study that calibrates the MIRS with the theory and dynamically similar experiments. We find that the surface discretization called spherical centroidal Voronoi tessellations (SCVT) is the most accurate and robust for all motions when the point distribution on the sphere's surface is no longer symmetric with respect to the boundary. Our tests for popular surface discretizations using spherical coordinates or projection of points on a cube to a sphere (6-patch) show that they can only be used when symmetry, with respect to the boundary, is guaranteed. We also find a constant ratio, for all motions, of the optimal regularization parameter in free space to the inverse of the square root of the number of points used in SCVT. Our ongoing study will reveal if the discretization errors, optimal regularization parameters, and constant ratio are still the same if we change the regularization function in the MIRS.

Funding Source: National Science Foundation

Synthesis and Evaluation of Second-Generation ROS-Activatable Prodrugs

Noah Gilbertson*, Christina Cooley

AA147 is a small molecule activator of ATF6, a transcription factor of the Unfolded Protein Response (UPR), a stress-responsive signaling pathway that mitigates the misfolding of proteins with the ability to enable the scavenging of damaging Reactive Oxygen Species (ROS). However, constant activation of the UPR by AA147 can lead to liver disease, and in extreme cases, apoptosis.

To avoid global ATF6 activation, the Cooley Lab is working to develop various prodrugs of AA147 that are biologically inactive until encountering diseased tissue due to the installation of a boronic ester cage system. These inactivated prodrugs will remain inactive until they come into contact with ROS levels indicative of disease.

As ROS levels are highly upregulated following an ischemia-reperfusion event (stroke/heart attack), a prodrug was designed and synthesized that would release AA147 into diseased tissue through a reaction with hydrogen peroxide, a type of ROS. Although the prodrug was able to release AA147 and provide significant protection to primary cardiomyocytes following an ischemia-reperfusion challenge, the initially designed prodrug exhibited relatively slow release kinetics due to the rate-limiting 1,6-elimination linker.

To increase the AA147 release kinetics and downstream protection of heart tissue, we have designed a series of new prodrugs, considering steric, electronic, and entropic impacts to increase the kinetics of therapeutic release and improve biological activity while maintaining stability. Functional groups such as carbonates have been added into the linker in order to increase the speed of release according to Le Chatelier's principle for example, while various alkyl groups have been added to the benzylic position to increase steric bulk around the hydrolytically labile carbonyl carbon and increase stability. Progress on these syntheses, their physiological stability, and their release kinetics upon peroxide administration as monitored via LCMS techniques as well as UV-VIS spectroscopic techniques will be discussed.

Funding Source: Beckman Foundation, Welch Foundation, National Science Foundation

Atomic Collisions with a Trapped Ion

Angela Graf*, [Nirav Mehta](#)

We model the collision of a Lithium atom with a trapped Ytterbium ion within the adiabatic hyperspherical approach in one spatial dimension, treating the trapping potential for the ion as an infinitely massive third particle. We use a zero-energy solution to the two-body problem to impose a short-ranged two-body boundary condition on the adiabatic eigenfunctions. This boundary condition depends on the hyperradius R , and in our numerical scheme must be translated to a particular b-spline basis set at each value of the hyperradius. We present a straightforward method for the computation of the adiabatic potential energy curves and all nonadiabatic couplings, as well as a procedure for the diabatization of sharply avoided crossings, providing a path forward for the calculation of scattering cross sections. We note that this method opens new possibilities for incorporating long-ranged two-body physics into few-body calculations.

Multi-Modal EEG NEO-FFI with Trained Attention Layer (MENTAL) for Mental Disorder Prediction

Garrett Greiner*, [Yu Zhang](#)

Early detection and accurate diagnosis of mental disorders is a task of the utmost importance. Providing proper care to affected individuals earlier on can result in quicker recovery. However, current methods for detecting mental disorders are less objective, and studies have shown that non-psychiatric physicians provided inaccurate diagnoses of depression 60% of the time. Previous studies have demonstrated that features of EEG data, such as Power Spectral Density (PSD), could be useful biomarkers for indicating the onset of various mental disorders. In addition, certain personality traits as captured by the NEO-FFI questionnaire have been shown to be correlated with mental disorders. Therefore, we propose MENTAL (Multi-modal EEG NEO-FFI with Trained Attention Layer) to predict an individual's mental state using both EEG and NEO-FFI data. We include an attention layer in order to capture the interactions between personality traits and PSD features, which emphasizes the important PSD features. We use a Recurrent Neural Network (RNN) to model the temporal nature of EEG data. We use the Two Decades Brainclinics Research Archive for Insights in Neuroscience (TDBRAIN) dataset. The use of EEG data for mental disorder prediction is a relatively new practice, and existing results have been generated from small datasets. Using TDBRAIN, we are able to train our model on a larger dataset, and produce more meaningful results. MENTAL is one of the first models to utilize both NEO-FFI and EEG data and provides objective and accurate early prediction of multiple mental disorders. It can provide quick and accurate indications that assist doctors in the diagnostic process. It is also a cost-effective and non-invasive technique more accessible than alternatives, which could help address and alleviate mental health struggles for the younger population. This can lead to acceptance and support for individuals living with mental health challenges.

Disability in Fairy Tale Forests

Sandra Gurrola*, Heather Sullivan

This summer I am studying how disabilities are represented in fairy tale forests. Disability studies in literature examine how disability is portrayed, the purpose of its portrayal, and the implications made about the disabled experience. Amanda Leduc's *Disfigured: On Fairy Tales, Disability, and Making Space* and Ann Schmiesing's *Disability, Deformity, and Disease in the Grimms' Fairy Tales* analyze the portrayal of disabilities in fairy tales. Sarah Maitland's *From the Forest: A Search for the Hidden Roots of Our Fairy Tales* investigates fairy tales to see how society perceives forests. My project narrows the focus to explore how disabled characters in fairy tales are often isolated and made to seem "other" in the forests. My work this summer will contribute to the chapter "Forest Power: Wood, the Woods, Trees, and Animism in Fairy Tales" in Dr. Sullivan's book *The Dark Green: Plants, People, and Power*. I will specifically be looking at six Brothers Grimm tales, including "Hans My Hedgehog", "Hansel and Gretel", and "The Six Swans". The forests provide both positive and negative experiences for the disabled characters. The disabled heroes find themselves in the woods where they find their own identity and how to better fit into society by meeting a king and ultimately being cured of their disability once they leave the forest. The disabled witch mechanizes the forest to help trap her victim but never leaves as she is never cured. The character is isolated and cast into the woods and only leaves when it is to be cured and blend into society. These fairy tales convey that there is no place for a disabled individual in society. Forests, the ultimate "others," are the place for all "others."

Funding Source: Murchison Fellowship

How San Antonio's Catholic Women Shaped Local World War II Efforts

Jordyn Guzman*, [Sarah Luginbill](#)

This project uncovers the role of San Antonio's Catholic women during World War II, analyzing how faith, patriotism, and homemaking skills intertwined to place them at the forefront of war efforts. Through archival research at Trinity University, University of the Incarnate Word, Our Lady of the Lake University, and the Archdiocese of San Antonio, we investigate the inherently gendered aspects of World War II efforts in San Antonio and examine faith as a wartime motivator in Catholic media directed towards women. Our research pulls from both student and local publications published in the early 1940s, utilizing both textual and photographic evidence to illustrate both the local perception of the ideal Catholic woman and her role in wartime, as well as how these women came to lead war efforts.

Fluorescent Imaging of *Pseudomonas aeruginosa*: Filament and Cell Body Labeling

Jordan Ha*, Mahika Desai, Nicola Ferguson, Frank Healy

Bacteria possess the ability to navigate through fluid environments by utilizing an organelle known as the flagellum. The flagellum, attached to the cell membrane, is composed of a hook, filament, and basal body, which contains a motor complex at its base to drive movement. These motors are set into motion by the torque generated by stators, which are transmembrane complexes capable of transforming the movement of ions across the cell membrane into a rotational force. The physical properties underlying the swimming dynamics of *Pseudomonas aeruginosa* are of great interest, prompting the development of methods to observe and quantify them by using fluorescence labeling techniques. In one set of experiments, site-directed mutagenesis was used to substitute a surface exposed threonine for a chemically reactive cysteine (T394C) in the FliC filament. An oligonucleotide primer with the desired mutation was annealed to a template plasmid carrying the cloned fliC gene to generate a plasmid with the T394C substitution. Wild type plasmids were eliminated by DpnI digestion, and mutant plasmids were transformed into bacteria. The cysteine sulfhydryl was used in labeling reactions of the flagellar filament using Alexa Fluor maleimide conjugates. In another set of experiments, Alexa Fluor succinimidyl conjugates were used for labeling of amines on the surfaces of bacterial cell bodies. Motility dynamics of cells with labeled flagellar filaments and bodies were observed using fluorescence microscopy. By refining our understanding of bacterial swimming patterns through these precise observation techniques, we hope to gain valuable insights into the behavior of *P. aeruginosa* and pave the way for future advancements.

Synthesis, and Purification of α -Keto Acids as Model Systems for Understanding Air-Water Interface Reactivity

***Andie Hadley, Jess Rugeley, Rebecca Rapf**

Air-water interfaces are ubiquitous in natural environments, both at the surface of oceans and on atmospheric aerosol. These interfaces concentrate and align organic material, resulting in the formation of organic films, including the sea surface microlayer (SML). Reactivity at interfaces such as these is likely to be a major contributor to the processing of organics in the atmosphere and is still poorly understood. Past studies have suggested that interfaces can promote reactivity and increase reaction rates as compared to the bulk. Sunlight-driven interfacial processes are particularly intriguing. In order to examine interfacial photochemistry, we have developed a library of α -keto acids of varying tail lengths and surface activity, making them an excellent model system as their bulk aqueous photochemical properties have been well studied and can be compared to evaluate the effects of surface partitioning molecules on their photochemical products. Understanding the orientation of the α -keto acids and the products they produce at the air-water interface is vital to understanding the role of the SML in environmental chemistry.

Here, we report on the synthesis and purification of three alkyl α -keto acids: 2-oxomyristic acid, 2-oxostearic acid, and 2-oxoeicosanoic acid, which are 14, 18, and 20 carbon molecules, respectively, via a Grignard reaction. We will also report on the effectiveness of a variety of purification techniques. High purity is important, as even trace impurities can affect the properties of organic films.

Funding Source: ACS Petroleum Research Fund, Trinity University Start-Up Fund

The Possible Effects of Rieske Reduction Potential on Superoxide Formation in the bc_1 Complex

Graycen Hall*, Omkar Satpathy*, Katelyn Silverio, Laura Hunsicker-Wang

The electron transport chain utilizes four protein complexes to generate an electrochemical gradient necessary for ATP synthesis. Complex III of the electron transport chain contains the Rieske protein. The [2Fe-2S] cluster of this protein is responsible for the transport of one electron during the quinol cycle (Q cycle). The successful transfer of electrons relies on an optimized reduction potential between quinol, Rieske, and cytochrome c_1 to drive the electron passage. If the reduction potential of Rieske is too low, it may fail to or inefficiently accept the electron from quinol. In turn, the electron may react with molecular oxygen to produce superoxide. Superoxide is a form of reactive oxygen species (ROS) that can cause harm to the cell in large quantities. Thus, a mismatch in reduction potential between the Rieske protein and quinol may serve as a possible source of superoxide production.

In order to investigate this hypothesis, two different systems are employed. The first aspect of the project focuses on measuring the reduction potential of the isolated *Saccharomyces cerevisiae* Rieske protein (*ScRieske*) *in vitro*. Several isolated *ScRieske* mutants are being produced in order to explore the effect of altering specific amino acids that are predicted to change the reduction potentials. The second part of the project centers on measuring the levels of superoxide produced by intact *S. cerevisiae* Complex III (*ScComplex III*) *in vivo*. The same mutants from part one are being produced in *ScComplex III*, and are being analyzed using growth assays to assess the phenotypic effect of the mutant and confocal microscopy to quantify the amount of superoxide produced.

Funding Sources: Welch Foundation, Voelcker Foundation, Wheeler Foundation, Trinity Chemistry Department

Invisible Strings: The Math that Binds Districts

M. Kent Hamatani*, **Anita Ashok**, E. Cabral Balreira

Gerrymandering is the act of dividing electoral districts so that one party or group has an advantage in the election outcome. It is a multifaceted issue that spans multiple disciplines from political science to mathematics. As electoral districts are being drawn, there are constitutionally protected regions of like-minded people with discernible characteristics, such as race, called “communities of interest” (COI), that must remain within the same electoral district. We analyzed the state of Texas, and the data collected from the 2020 census, to detect if the current plan, Plan 2193, was intentionally gerrymandered. Our approach was to use the Gerryindex, a measure that provides an estimate of the number of competitive and safe districts for each party based on a large collection of plans and can indicate packing and cracking, the methods by which gerrymandering occurs. In our approach, we analyze how the Voting Rights Act of 1965 and the identification of COI impact the Gerryindex and compare that information to the actual election results. Our contribution is to use clustering methods based on topological data analysis to analyze the similarities between features associated with Voter Tabulation Districts and propose new communities. The communities we predict with our models are different from the current COI in that they are mathematically clustered groups based on race/ethnicity, census demographics, and partisan features, whereas the current COI are generally defined from a non-mathematical point of view.

Cisnormativity and Strategic Disclosure in the Family

Harrison Hartman*, **Noor Jahlul***, Amy Stone, Otis McCandless-Capman, Chiara Pride

This paper examines the challenges faced by LGBTQ+ individuals when revealing their diverse gender identities, such as being transgender, non-binary, or genderfluid, to their families. It addresses how trans and non-binary youth navigate the dominant cultural assumption of cisnormativity, that everyone is cisgender or should be. While previous scholars have studied the disclosure of sexuality as a set of stages or as a process of strategic "outing," limited research has focused on the experiences of non-cisgender youth in disclosing their gender identity.

In this paper, we analyze semi-structured interviews conducted with 31 youth with both minoritized sexual and gender identities. The youth described in this paper participated in the Family Housing and Me (FHAM) project—a longitudinal study of 83 LGBTQ youth (ages 16-19) in South Texas and the Inland Empire. Analysis reveals a practice of what we refer to as *strategic disclosure* employed by trans and non-binary youth when revealing aspects of their gender identity and sexual orientation to family members.

Through a grounded theory analysis of the interviews, preliminary findings suggest that youth use both perceived and actual expectations of cisnormativity within the family as a guide for strategic disclosure. By employing disclosure strategies, trans and non-binary youth negotiate gendered expectations, acceptance, understanding, and potential rejection. Findings indicate that the decision to disclose aspects of their identity within the family is influenced by a common set of criteria such as familial politics, religiosity, and generational gaps, among other factors. This study contributes to family studies by shedding light on how LGBTQ youth manage cisnormative expectations within their family support networks. Moreover, it offers insights into the family characteristics trans and non-binary youth respond to maintain safety and support amidst a paradigm of cisnormativity.

Park Advocacy: Blending Community and Conservation

Lydia Heisel*, Katie Ramirez

I was afforded the unique opportunity to intern at Phil Hardberger Park Conservancy, the nonprofit that supports Phil Hardberger Park. This park is a newer addition to San Antonio, opening in 2010, and most recently in 2020 completing the Robert L.B Tobin Land Bridge, the main attraction of the park. They host many programs and events and are dedicated to building relationships with city staff and the park community, listening to their concerns and working to fulfill their needs.

As an intern, I have been extremely involved in the operations of the park by leading field trips, working with volunteers, sitting in on board meetings, helping the park naturalist with bird surveys, research, and checking wildlife cameras on the land bridge. The park used to be a dairy farm and their office is located on the former homestead. The Conservancy is aiming to rehabilitate the dairy barn (circa 1925) on the site and I wanted to take this project on. I researched the site, sat in on meetings with architects, researched and started writing a grant to help fund this project, and compiled a large document containing all of the information I had gathered. Additionally, I outlined a plan for a future event to be held in 2025 to celebrate the 100-year anniversary of the Voelcker Dairy Barn. My internship at Phil Hardberger Park Conservancy has given me valuable insight and experience in a park and nonprofit setting, and has strengthened my professional skills. I now feel more confident in my interpersonal communication, collaborative, professional writing, and adaptive problem solving abilities. This is an experience that I know I will carry with me in my future endeavors.

Aerodynamic Characterization of a Free-Flight Sphere and Redevelopment of an Electromechanically Actuated Pitot Probe in a Mach 7 Wind Tunnel

Adrian Herrera*, Christopher Combs

The purpose of this project is to enhance our understanding of free-flight experimentation at hypersonic speeds and design mounts for a electromechanical pitot probe traversal system on the horizontal axis of a wind tunnel test section. This summer, I had the opportunity to work with the University of Texas at San Antonio's Hypersonics Lab. This prestigious facility is among the select few equipped with a cutting-edge Mach 7 Ludwig Tube Wind Tunnel with the overarching objective to contribute to the advancement of aerodynamics and pave the way for the development of next-generation high-speed systems.

For my research I have been tasked with conducting free-flight testing which has involved designing a instrumented 3D-printed sphere with a 2 inch diameter limitation. To facilitate data collection compatible with Arduino IDE, our instrumentation setup includes a Seeed Studio XIAO RP2040 microcontroller, a ICM-20948 Accelerometer, Gyroscope, Magnetometer Sensor Board, and a LiPo Battery. Through the utilization of these miniaturized electronics, we aim to acquire motion data of the instrumented sphere during hypersonic flow. This method should show promise for reliable measurement of aerodynamic coefficients, particularly because the data obtained are in more directly applicable forms of accelerations and rates of turn. To prepare the sphere for rigorous testing, we had to develop a catching system and redesign a stand that is mounted and hinged on the flat-plate of the wind tunnel's test section to hold it in place before release in free-flight. This will allow us to see how we can improve and introduce refined models and scaled-down aircraft prototypes into the wind tunnel.

Another project I focused on was the redevelopment of an electromechanical actuated pitot probe traversal system by designing mounts and stands to hold this system on an optical table and securely characterize the transverse flow quality in the wind tunnel test section. Addressing concerns raised during an oil flow experiment, the study seeks to determine the origin of observed transverse flow non-uniformity, whether it stems from inherent wind tunnel flow or specific aerodynamic factors influencing the experiment.

Funding Source: McNair Scholars Program

Evaluation of the ZO-1-ZU5 Domain in Epithelial Tight Junction Regulation

Cristian G. Holloway*, **Garrett D. Palmer***, Jonathan M. King, Ph.D.

Tight junctions (TJ) are complexes responsible for connecting neighboring cells permitting compartmentalization. TJs are composed of transmembrane and scaffolding proteins found at the apical junction complex on the lateral borders of the cell. Zonula occludens-1 (ZO-1) is an essential TJ component contributing to junctional formation by mediating interactions between junctional proteins and the actomyosin cytoskeleton. MDCK II cells, a model epithelial cell line, that have ZO-1 knocked-out (ZO-1 KO) have observable phenotypic changes. Loss of ZO-1 has been shown to increase nuclear density in MDCK II cells and we hypothesized that rescuing ZO-1 function with eGFP-ZO-1- Δ ZU5 a C-terminal truncation mutant will restore nuclear density. The ZU5 domain is known to bind the cingulin that interacts with myosin resulting in ZO-1 adopting an extended or stretched conformation. We are investigating the role of eGFP-ZO-1- Δ ZU5 through gene expression, confocal imaging and functional assays. This study highlights and expands our understanding of how ZO-1 regulates the mechanical, genetic, and phenotypic properties of epithelial cells.

Funding Source: Biology Summer Undergraduate Research Fellowship, Brackenridge Endowment

Phase Behavior of Polycyclic Aromatic Hydrocarbon Derivatives at the Air-Water Interface

Katherine Holt*, Rebecca Rapf

Organic molecules partition preferentially to the air-water interface and form organic films on water surfaces in the natural environment, including aerosol droplets and the sea surface microlayer. How the morphology and chemistry of organics changes at these interfaces is an important factor in understanding how atmospheric processing occurs in the environment. One key class of molecules to study is polycyclic aromatic hydrocarbons (PAHs) and their derivatives because they are organic environmental pollutants, and they are highly susceptible to self-assembly, aggregation, and pi-stacking, which will likely impact their properties at interfaces. Here, we will report on the phase behavior, spectroscopy, and photochemistry of PAHs at air-water interfaces, including when intercalated into surfactant films, using Langmuir trough compression isotherms and ultraviolet reflection-absorption spectroscopy (UVRAS) to examine films in situ. Comparison will be made to offline analysis of bulk solutions, including UV-vis spectroscopy, fluorimetry, and mass spectrometry.

Classroom Censorship in Texas Schools

Harper Horn-Clegg*, Habiba Noor

In the summer of 2021, the Texas State Legislature passed new laws regulating the teaching of history, current events, and race in public schools. This study investigates how shifting discourses on race have impacted social studies classrooms, which plays a fundamental role in the ongoing politicization of classroom discussions. Changes in the regulation of instruction in public schools are foundational for the continued politicization of classroom rhetoric. Through ethnographic methods involving Texas teachers, this research presents different narratives on how these laws have impacted teacher practice and argues that teacher agency has been eroded in the face of this politicized discourse. This is done using analysis of the experiences of educators who have been reprimanded for their use of educational materials that have come to fall outside the boundaries of acceptable curricula.

An Obligation to the Public: Working at the San Antonio Current and Trinitonian

Colin Houston*, **Dean Zach*** Alicia Myers

This summer, I worked alongside Dean Zach as an editorial intern at the San Antonio Current and as an intern at the Trinitonian. The San Antonio Current is a local alternative newspaper focused on socially conscious and niche coverage that may be more difficult to find in other publications. The Trinitonian is the campus newspaper for Trinity University which aims to provide accurate coverage of events at the school so that students can operate from an informed perspective. As someone who has lived in San Antonio my entire life and attends Trinity University, this internship appealed to my desire to improve the experiences of others who also call these places home.

As an editorial intern, I was responsible for helping maintain the online calendar, contributing writing to the print calendar, contributing to slideshow content, and writing online blog posts and articles about notable events. As a Trinitonian intern, I was responsible for putting together the Trinity Declassified, a guide to Trinity University for first year and transfer students. This was an extensive process that involved short-form and long-form writing, research, utilizing software such as Adobe InDesign, and coordinating with Dean along with other contributors and advertisers.

This internship provided me substantial experience in various facets of what goes into producing and maintaining a publication. I developed a proficiency in many new things such as writing blog content, events coverage, and digital production, all of which were relatively new to me when I started. Working at the Current and on the Trinity Declassified allowed me to explore and reaffirm my interest in a new career path, and additionally helped me develop an appreciation for all of the things that newspapers need to cover rather than being solely focused on grander social and political issues as I was before.

A Little Bit of Everything

Casimir Huffman*, Stacey Connelly

First established in 1912, the Public Theater of San Antonio—previously The Playhouse San Antonio, and before that The San Pedro Playhouse, and before *that* the San Antonio Little Theater—the longest-running theatre company in Texas, is where I have had the pleasure of interning this summer. This historic theater has an incredibly collaborative environment; as an intern, I've been given a uniquely holistic approach to the arts. I've spent a week or two each with one department at a time, working with the director of each area, before switching to a different section of the Public's inner workings.

Beginning with marketing, I learned about digital advertising, updated marketing schedules, created promotional designs using templates from past productions, and worked on my main project in this department: launching a TikTok account for the theatre. In doing this, I not only did the basic work of setting up an account and brainstorming/researching content to create, but also got hands-on experience with videography and video editing, capturing tons of footage of the theatre's different spaces and many moments from rehearsals. From there, I joined the costume team, working tirelessly to prepare for the latest show's opening. I learned different hand-sewing techniques and did lots of ironing, spray-painting, and laundry. After my hectic but wonderful time there, I shifted to the scene shop, where things had calmed down significantly as the show was now running. Most of my work there involved cleaning and organizing the shop, which had been ravaged by the chaos that is show preparation. I finally ended up with development, where I dug through the Public's rich archives, sifting through its century-long history, finding valuable photos, programs, and documents to use in future marketing and social events.

This internship has been educational above all else, made even better by the welcoming environment provided by the wonderful staff.

Funding Source: Arts, Letters, and Enterprise Program

Water Conservation and Soil Percolation: A Summer with the Greater Edwards Aquifer Alliance

Emily Jamieson*, James Shinkle

This summer, I interned at the Greater Edwards Aquifer Alliance as an Urban Admin & Environment Intern through the Arts, Letters, & Enterprises program. I have worked under their Technical Director, Nathan Glavy, who acted as my supervisor.

The Greater Edwards Aquifer Alliance (GEAA) is a 501(c)(3) nonprofit organization that works to promote advocacy and legislative action for the preservation of the Edwards Aquifer, as well as conservation for the surrounding Texas Hill Country that sustains it. Forming an alliance of 56 member groups, GEAA and their member groups continue to progress on saving the Edwards Aquifer.

As the Urban Admin & Environment Intern, I have had the opportunity to work in the field, aid in the beginning of new projects, and cultivate the various social media profiles. The most prominent project I have participated in has been the Soil Health Project and the Clean River Project (CRP) Data Mining. With the Soil Health Project, I have had the opportunity to participate in field work and soil percolation testing.

My involvement in this organization has shown me the scopes of impact non-profits and other dedications can have on many levels, from regional to state.

Using an online database to calculate the statistical significance of genes involved in biological functions

Kily Jasso*, Matt Hibbs

To understand organisms' basic biology, experiments have been conducted determining which genes are involved when organisms carry out a specific action or are put in a specific situation. These experiments often result in lists of genes affected in some way, and a natural follow-up analysis determines if these genes are related. Online databases such as GeneOntology.org can be used for these analyses to treat diseases such as cancer by comparing irregular cancer cells to healthy cells and discerning the difference between them to better treat patients. A major issue with current databases is that many are highly complicated and unintuitive to use. The long-term goal of my project is to create a user-friendly system that takes user input and produces an easy-to-understand visual representation of a gene's direct and indirect involvement in biological functions along with necessary information. The purpose of my current project is to parse through database files containing gene information, accept a user's input of a list of genes, and determine the statistical probability of involvement in biological functions to create a table that can be exported as a JSON file to be later visualized. To do this, I start with files from the GeneOntology.org database and create dictionaries for every gene and its alias names, identify genes and the biological processes they are involved in, and the biological processes information. With this information, I can take a user's input and determine the genes requested based on possible names the user could have inputted and find the number of biological functions the genes are involved in, the total number of genes, and the total number of biological functions. Then, using the hypergeometric distribution, I can determine the statistical significance of a list of genes involved with any biological function.

Funding Source: HEP Computer Science Research Fellowship

Understanding the Relationship Between Narcissism and Writing Production

Kinsey Jeansonne*, Harry Wallace

In this project, we studied the extent to which narcissism predicts writing production. Very little research has been conducted on the psychology of writing, and few personality factors have been shown to predict writing habits and tendencies. Behaviors correlated with narcissism, such as high self-confidence and an increased tendency to “go with your gut”, were hypothesized to be advantageous during writing tasks. Trinity University students completed a survey on academic attitudes and behaviors, which asked participants questions pertaining to writing processes and self-efficacy. The survey also measured levels of narcissism using the Narcissistic Personality Inventory and the Narcissistic Admiration and Rivalry Scale. We found that students scoring high on measures of narcissism reported writing faster and having to expend less effort to write, being more confident in their writing ability, and being more likely to engage in unethical behaviors while writing. This finding prompted us to begin developing an experiment designed to investigate if and how higher levels of narcissism are advantageous for students completing a stress-inducing writing task.

Funding Source: Murchison Fellowship

Modeling Fault-Related Deformation and the Implications for Geothermal Energy

Audrey Jennings*, Benjamin Surpless

Although geothermal energy represents a growing portion of the world's clean energy, limited exploration of geothermal locations has minimized utilization. Research indicates that regions of normal faulting, where fault-related fracturing permits fluid flow, represent promising locations for geothermal energy, especially between fault segments where interacting stress fields amplify deformation. The Basin and Range Province in the western United States hosts segmented normal faults, making it a prime location for exploration.

To better understand geothermal potential near normal fault systems, we recorded deformation data along the Sevier fault zone of the Basin and Range province. Using these datasets to validate our work, we constructed 3D models in the Fault Response Modeling module of MOVE 2020 (by *Petex*). Models included a single fault (10 km long, 6 km deep, dipping at 70 degrees, with a slip gradient tapering to 0 at the fault tips) and two faults of the same specifications, overlapping by 1 km. With these models, we calculated throw, maximum coulomb shear stress, strain, and strain dilation for single and multi-fault systems, varying fault depths (500 m depth, 1.5 km depth, and 3.5 km depth), and progressive slip (10 m, 50 m, and 200 m slip).

Though we noted differences in stress, strain, and fracturing across models, fracture intensity was consistently high near the fault and between interacting fault tips. Fracturing also shifted from high within the hanging wall to high in the footwall as fault depth increased. These results indicate that potential geothermal locations likely lie near normal faults, but may vary with depth. Furthermore, we expect high geothermal potential near interacting tips in segmented normal fault systems (like the Sevier), if heat flow is also high. The use of 3D modeling could further the exploration of geothermal energy systems and potentially allow for greater utilization.

Analyzing the Rhetoric and Mannerisms of Middle Eastern Authoritarian Leaders

Jaida Johnson*, David Lesch

This study examines the role of soft power in the strategies of authoritarian leaders, focusing on Bashar al-Assad, Gamal Abdel Nasser, Hafez al-Assad, and Saddam Hussein. It considers the historical context of the Middle East, including colonization and regional rhetoric dynamics. The goal is to provide an in-depth analysis of Middle Eastern authoritarian rhetoric, shedding light on their motivations and strategies.

Using a mixed-methods approach, the study analyzes speeches, interviews, campaign advertisements, and mannerisms of these leaders to establish a genre-specific criticism. It aims to identify the parameters of Middle Eastern authoritarian rhetoric as a distinct subgenre of political rhetoric. The study addresses the question of whether there is a category that can classify and group these leaders together and presents key findings.

The main findings highlight the use of neo-patriarchy, familial phrases, ethnic nationalism with a pan-Arab focus, the narrative of liberation from colonialism, resistance to Western interference, and specific speech formatting choices. The study also explores the reasons behind the common themes and the origins of symbols, such as nationalistic or religious imagery, used to promote their image.

However, the study has limitations. It is challenging to incorporate public opinion and account for biases in interpreting speeches due to the speaker-audience relationship. Translation difficulties for cultural references and Arabic phrases further affect the analysis. Recognizing this unique rhetorical genre allows historians and foreign relations experts to objectively view these leaders without preconceived notions influenced by Western-centric scholarship.

Effects of Short and Long Wavelength UV-B Radiation on *B. curtipendula* and *C. latifolium*

Ella Jones*, James Shinkle

The Shinkle lab previously demonstrated that short wavelength UV-B (SW UV-B, 290-300nm) elicits cell structure and biochemical changes in both *B. curtipendula* and *C. latifolium*. However, these species have not previously been studied for their responses to long wavelength UV-B (LW UV-B, 300-320nm). This research aims to enhance our understanding of plant responses in *B. curtipendula* and *C. latifolium* to SW and LW UV-B. We use two locations, Kerrville (610m) and Mico (330m), Texas. Preliminary results have been collected from Kerrville, Texas. Grasses grew in the greenhouse for 3-4 weeks. Three UV-B radiation exclusion chambers were constructed, one with aclar (AC, UV-B transparent), cellulose acetate (CA, blocking wavelengths <300 nm), and polyester (P, blocking wavelengths <320 nm). We exposed the grasses to outdoor conditions for 7 days then returned them to the lab. After exposure, *B. curtipendula* decreased reflectance under both cellulose acetate by 118.3% and polyester by 161.2% while it increased reflectance under aclar by 25.8%. *C. latifolium* showed reflectance decreasing under all three conditions, with cellulose acetate by 68.6%, polyester by 63.3%, and aclar by 103.3%. The magnitude of absorption also increased for *B. curtipendula* under cellulose acetate by 20.4% and aclar by 45.1% while decreasing under polyester by 8.1%. Fine structure differences in the peaks of the absorbance spectra also occurred, shifting from SW to LW UV-B after treatment. The absorption spectra of *C. latifolium* demonstrated a decrease in magnitude for all three conditions after exposure. However, the shape of the spectra remained the same for all treatments. From our preliminary data, we conclude that exposure to both SW and LW UV-B increases reflectance and absorption in *B. curtipendula* while it decreases in *C. latifolium*. This shows that UV-B radiation stimulates different plant responses between the two grasses.

Taylor-Couette Vortex Flow: Design and Construction of a Research-Grade Testing Apparatus

Marco Jonsson*, Orrin Shindell, Kevin Nickels

In Fluid Mechanics, a salient feature of many physical and theoretical systems is the presence of chaos, a concept that extends beyond the abilities of traditional mathematical modeling. When a system reaches chaotic dynamical motion, an “analytical solution” for the exact interactions is no longer possible, and requires either precise numerical approximation, or physical modeling to better understand its behavior. Much of the behavior of a fluid system is governed by its surface geometry and by the Reynold’s number, a dimensionless quantity relating the relative viscosity, density, and velocity of a system. In fluid dynamics, two well-known phenomena, laminar and turbulent flow, are separated by a lesser-known interaction that occurs only in certain geometries. The focus of this construction was to isolate this transition interaction, known as Taylor-Couette Vortical Flow.

In previous iterations, we built a small-scale version of this apparatus, using two concentric cylinders with a gap that was filled with a rheoscopic liquid. By controlling the relative velocity of the inner cylinder surfaces with an electric motor, we obtained Taylor Vortex Flow at a high Reynold’s Number. Using Fusion 360, we then developed a design for a large-scale version of this device, combining plans from a collaborator’s design, as well as many parts and adjustments of our own. We also made efforts to expand the functionality of the initial design to allow for independent rotation of the inner and outer cylinders. Upon completion of the 3-D designs, we began construction of the apparatus, adding in a gearing system that permits the testing of extremely high viscosity fluids like silicone oil, while still maintaining high Reynold’s Numbers. Once construction is complete, we plan to perform signal analysis on various fluids to better understand and identify the onset of turbulence as the fluid motion crosses from laminar flow, to Taylor Vortexes, to turbulence.

Uncontrolled Photoinitiated Fluorogenic Polymerization as a Strategy for Open-air, High Throughput Analyte Detection

Margaret Karim*, Cara Dewitt, Noah Gilbertson, Christina Cooley

For a sensitive detection assay, signal amplification is necessary to reliably detect low concentrations of analyte in solution. Polymerization is a desirable amplification technique that forms a long polymer chain from a single initiation event. The Cooley Lab is developing a detection assay using fluorogenic polymerization, allowing for simple, real-time monitoring of the signal amplification. This method couples the polymerization initiation event to the presence of a desired analyte so that the formation of a visible, fluorescent polymer signals analyte presence. Although promising, sensitivity to oxygen and long reaction times limit the original method's translation to bio-detection applications, prompting the development of alternative fluorogenic polymerization reaction platforms. Therefore, an uncontrolled photoinitiated polymerization technique was developed and optimized with an enzymatic degassing technique, enabling the reaction to occur in an open-air vessel without oxygen interference. Additionally, the uncontrolled nature of the polymerization decreases the time required for signal detection. The results of the optimization strategies to improve the efficiency, throughput, and fluorescence of the detection assay will be presented.

Too Many Polar Bears, Not Enough People: Content Analysis of AI-Generated Climate Change Depictions

Nadia Kern*, [Althea Delwiche](#)

No matter the country, state, or town one resides in, climate change is bound to bring more drought, flooding, heatwaves, or wildfire...just to name a few possibilities. In an attempt to mitigate climate change, artificial intelligence offers solutions ranging from increasing agricultural efficiency to making accurate climate predictions. Yet, artificial intelligence models may perpetuate climate change perceptions and misconceptions after inheriting human biases in the training process.

This study reports findings from a quantitative content analysis of 400 visual depictions of climate change generated by the two most recent versions of the AI art platform Midjourney. In an attempt to understand how depictions differ across AI models, two human coders applied a codebook to analyze images according to categories such as image style, composition, setting, climate change signifiers, and anthropogenic causes of climate change.

Although data collection is ongoing as of early July, the pilot test demonstrated a high frequency of polar bears. In existing climate change communication, polar bears are known as the poster-child of climate change. Remarkably, 37.5% of the images generated by Midjourney featured at least one polar bear, thereby echoing the issue of overused symbols in the visual communication of climate change. While the threat to polar bears is indeed a significant issue, climate change has a far-reaching impact on a wide range of other ecosystems and species. Overrepresentation of the polar bear could hinder the ability of humans to relate to their specific environment, thus decreasing pro-environmental behavior action. Discerning biases within these images holds significance, as continuing to promote flawed representations could obstruct our understanding and response to climate change.

Modeling the Glass Transition with a Two-Dimensional Colloid

Omarree Kimbrough*, Orrin Shindell

The molecular structure of amorphous solids (glasses) is too small to accurately measure with widely available resources. To overcome this limitation, colloidal systems, whose dispersed particles are analogous to the molecules of a glassy system, are often utilized, as they are more readily imaged with standard optical microscopy. Most experimental physical data of the glass transition has been collected in three dimensions, while most simulations model the mechanics in two dimensions. By using a two-dimensional Supported Lipid-Bilayer (SLB) with bound microparticles, we can experimentally model the glass transition through analogous colloidal viscosity mechanics. Using this model, we intend to gain a better understanding of this fundamental phenomenon as well as bridge the gap between experimental and theoretical data.

To facilitate this modeling, Giant Unilamellar Vesicles (GUVs) were ruptured to create SLBs; ~0.1 micron Small Unilamellar Vesicles (SUVs), adhered using Biotin-Streptavidin bonds, acted as the homogeneously dispersed microparticles to create a model colloid. Light microscopy was used to record the adhered SUVs while ImageJ was used to precisely map their movement. We will report our progress towards setting up the experimental procedures and determining the nature of the glass transition.

The Contemporary and its Past: an archival journey

Adam Kingery*, Kate Ritson

I worked as an archival intern at the Contemporary, a non-collecting contemporary art museum that exhibits local, national, and international artists. Since beginning as an artist-run exhibition space in 1986 under the name Blue Star Art Space, the museum has retained a variety of materials relating to past exhibitions such as newspaper articles or communications between artists and curators. I processed, organized, and cataloged these materials as the museum prepares to turn its archives over to UTSA.

I gained valuable insight into the multiple and varied perspectives of archive work. Working with the present archive, I dealt with decades of materials organized and prioritized by different generations of artists. I strove to understand the perspective of these past archivists. Some years, the museum preserved most materials from its exhibitions, while other years I only had postcards for each event. I developed a system to handle these two extremes. In light of this, It was important that the material be organized uniformly and succinctly to be as accessible as possible. I did this through various means such as cross-referencing the materials and creating orientation sheets so future readers can more readily find pertinent information.

My involvement at the Contemporary was particularly meaningful because of how it let me connect with the past. By going over the archival materials, I gained an individual viewpoint of the Contemporary's and the larger San Antonio art community's history. The unique perspectives I learned highlighted the value not only of archival materials, but also the tools needed for archival and museum work.

Pre-eruptive heating may aid magma degassing and reduce the risk of explosive volcanic eruptions

Remi Kurita*, Kurt Knesel

A fundamental problem in the assessment of volcanic hazards is understanding how and why volcanoes erupt either effusively or explosively. Although eruptive style depends on whether gas escapes or remains trapped in the magma during ascent, the factors governing outgassing remain unclear. To better understand the potential influence of pre-eruptive conditions on gas escape during effusive eruptions, we are studying crystals in rhyolitic lava from the Nimbin Rhyolite in eastern Australia using the scanning electron microscope at Trinity. The Nimbin Rhyolite is a large complex of lava domes and flows, with eruptive units up to 100 m thick and 5 km in length. Individual lavas are either crystal-poor (< 5 vol. %) or crystal-rich (10-30 vol. %), but contain similar crystal assemblages dominated by quartz, sanidine, and plagioclase.

Preliminary analysis of plagioclase phenocrysts in crystal-rich lava reveal euhedral to subhedral morphologies and uniform compositions (e.g., Anorthite (An) contents of 22.0 ± 1.5 and 22.0 ± 0.7 mol. % in cores and rims, respectively). In contrast, although phenocrysts in crystal-poor lava yield core compositions similar to those in crystal-rich lava (An = 24 ± 2 mol. %), the crystals are highly resorbed and at least one phenocryst contains enrichment in An content near its rim (up to 50 mol. %). This rim composition is similar to euhedral micro-phenocrysts (<0.5mm in size) with An contents of 48 ± 2 mol. %. These textural and chemical relationships are consistent with late-stage heating of crystal-rich magma to yield crystal-poor lava. Application of feldspar thermometry indicates an increase on the order of 100°C . Such pre-eruptive heating was likely achieved by chamber recharge involving hotter, more primitive magma. While recharge is a commonly accepted eruption trigger, in cases where reheating is substantial, it may also reduce the risk of explosive eruptions by lowering melt viscosity and enhancing volatile diffusion and magma degassing.

Funding source: Trinity University Geosciences Department

disABILITYsa: Learning to Serve the Community

Joseph Kusnadi*, Carl Leafstedt

This summer, I had the opportunity to serve as the Fundraising and Development Intern for disABILITYsa. disABILITYsa is a nonprofit organization that serves the city of San Antonio by educating, advancing, and engaging people with disabilities within the community. The nonprofit connects people with disabilities to the resources they need, runs various programs and events to create inclusion and promote independence, and strengthens other organizations that also serve people with disabilities. Having close relatives with disabilities, disABILITYsa caught my interest as it was a perfect opportunity for me to fulfill my own desire to help others less fortunate than myself.

As the Fundraising and Development Intern, my main responsibilities consisted of finding and networking with potential sponsors, updating and sending out grant applications, and assisting with organizing databases. During my internship, I made hundreds of phone calls to potential sponsors, sent out many grant applications, and organized databases of hundreds of sponsors and donors. However, I am grateful that I was given the opportunity to expand my work beyond sitting in front of a laptop, and attend different events that allowed me to interact with the community as well. I hosted booths at resource fairs as well as job fairs.

Interning at disABILITYsa has helped me develop and improve both my hard skills and soft skills. Through the use of different software such as Fluxx Grantseeker, Stripe, and Quickbooks, I am now familiar with a number of platforms that many other companies and organizations use. Furthermore, the phone calls I made and the in-person events I attended have honed my networking and communication skills. I am grateful to disABILITYsa for allowing me to gain valuable experience and knowledge in a professional work environment, as well as learning the importance of nonprofits and how they operate.

Male rats exposed to a socially-paired context decrease preference for a sucrose-paired context in a conditioned place preference paradigm

Aliya Lackan*, Blythe Iverson, Kah-Chung Leong

According to the United States Centers for Disease Control and Prevention (CDC), 73.6% of adults aged 20 and over were overweight from 2017-2018, with 41.9% of these individuals also suffering from obesity; additionally, about 1 in 10 Americans have diabetes, and more than 1 in 3 Americans are prediabetic. A major contributing factor to these disease states is the maladaptive preference of sugar reward. Social interaction and social support have been found to diminish drug-seeking behavior, suggesting that social reward may combat the reward or substance abuse. We hypothesize that the rewarding effects of sugar may also be contested by social reward. In order to examine the competing nature of sugar and social reward, male rats underwent a conditioned place preference paradigm in which one context was paired with sucrose (5 pellets every 10 minutes) and the other context was paired with a conspecific. In brief, all rats were first given 2 days of sucrose priming, and then were conditioned for 30 minutes for 8 consecutive days, during which they alternated between contexts each day of conditioning, and sucrose and social reward were counterbalanced within groups. Results revealed that in the absence of any conspecific context, rats showed a significant preference for the sucrose-paired context, but rats who were conditioned with both a sucrose-paired and a conspecific context did not display any preference for the sucrose-paired context. The results of the present study suggest that social reward may diminish sucrose conditioned place preference, and further research will focus on elucidating the specific structures involved in this effect. The neuropeptide oxytocin (OXT) is known to be implicated in both social processes and reward. As such, we investigate the role of OXT in modulating this shift in preference between sucrose and social reward.

Funding Source: Murchison Fellowship

Novel Immunological Reagents for the Identification of Biomarkers in New World Monkeys

***Ektoras Lambrou, Jessica Callery, Luis Giavedoni**

Biomarkers are specific DNAs, RNAs, proteins, protein modifications, or metabolites that reflect a biological state; a characteristic that is objectively measured and evaluated as an indicator of normal biological and pathogenic processes, or pharmacologic responses to therapeutic intervention. The use of Non-Human Primates (NHPs) as biomedical research models are powerful tools that offers insight into progression of various diseases and resulting immune responses. Due to genetic similarities between NHPs and humans, NHP studies can be used to better understand the same processes in humans, aiding in the identification of effective vaccines and therapies. Thus, identification of NHP biomarkers is critical for the validation of animal models of human disease. NHPs are separated into two main categories: New World monkeys (NWM) and Old World monkeys (OWM), which separated from humans 45 and 25 million years ago, respectively. Historically, OWM such as macaques have been the preferred NHP model; however, their high cost, sparsity, and large size have made NWMs more appealing to researchers in various fields. A major roadblock preventing the broad implementation of NWM models is the lack of available reagents that could serve as biomarkers.

Our research aims to develop reagents and assays that increase the translational value of studies using NWM. Specifically, we focus on the identification of cytokines and hormones of three NWM species: Marmosets, Owl monkeys and Squirrel monkeys. These cytokines and hormones are well known biomarkers of human disease. Our collaborative approach includes the production of recombinant marmoset biomarkers, immunization of mice with these recombinant molecules, identification of mouse monoclonal antibodies that bind to these recombinant molecules, and validation of immunoassays using the selected antibodies with ex-vivo and in-vivo NWM samples.

From Coyotes to Conjugation - Translating Skills to New Environments

Helene Le Gall*, Katie Ramirez

This summer, I had the opportunity to intern with the Phil Hardberger Park Conservancy. The position focused on promoting the park's dual missions of education and conservation. My summer experiences were astoundingly varied – from shadowing professionals to expanding my leadership skills, I was continually pushed to grow. As a non-profit working closely with San Antonio's parks department, the Phil Hardberger Conservancy supports urban ecology through its learning initiatives and conservation projects. I selected this organization because it allowed me to work in a context that promotes education and accessibility to nature.

While I reserved time to assist with existing programming, I additionally pursued various projects. By redesigning and translating online self-guided lesson plans into Spanish, I made learning materials more accessible to Latinx residents. Additionally, I assisted in research initiatives occurring in the park, collaborating with Casey Cowan, the Park Naturalist, with data entry to determine the flora preference of deer in 13 San Antonio Parks. I also helped with data processing of images of deer and coyotes from the park's land bridge. Finally, I had the opportunity to collect data for Dr. Phillips's ongoing research on the effects of sensory pollution on bird populations in the park.

Working on these projects allowed me to expand my range of skills as well as hone my ability to multitask between vastly different interdisciplinary projects. I explored new career options and networked with a diversity of professionals. I gained skills in plant identification and scientific nomenclature, expanded my proficiency in Excel and Canva, and I learned how to use Timelapse to tag images. I improved my translation and digital design skills and learned about the artistic peer review process. This internship allowed me to grow and gave me a clearer understanding of my strengths and what careers I wish to pursue post-graduation.

Funding Source: Arts, Letters, and Enterprise Program

Differential Neuroinflammatory Responses in Neural Stem Cells and Astrocytes to Reactive Oxygen Species

Austin Lee*, **Mikayla Potts***, **Katherine Hoang**, **Cora Lewis**, Andrea C. Jimenez-Vergara, Dany Munoz Pinto

Neuroinflammation has a prominent role in the pathogenesis of Alzheimer's Disease (AD), as well as several other incurable diseases including multiple sclerosis, and Parkinson's disease. AD results in a build up of irregular proteins that promote the release of cytokines and reactive oxygen species (ROS), which trigger a chronic inflammatory response that causes significant damage to brain tissue. ROS have a normal level of expression in the brain, and can be used for paracrine signaling, however elevated levels can be damaging and are a marker of inflammation. AD is the second most burdensome neurological disease on the healthcare system, and a detailed mechanism of how inflammatory astrocytes influence pathogenesis has not been found. In this work we examined the inflammatory response of astrocytes and Neural Stem Cells (NSCs) to ROS. Towards this end we examined the effects of ROS on astrocytes, NSCs, and astrocyte-NSCs cultures, in order to evaluate the individual cellular responses and paracrine signaling. The astrocytes and NSCs were activated by exposure to UV light in the presence of a photo reactive molecule to generate free radicals and ROS; the qRT-PCR was used to examine the changes in gene expression of inflammatory and reactive markers. Preliminary data suggests that astrocytes have a limited response to ROS while NSCs appear to have a strong inflammatory response to the same levels of ROS in the cell culture media.

Boundary Approximations of Curves for Planar Dynamical Systems

Mitchy Lee*, [E. Cabral Balreira](#), [Seth Fogarty](#)

Dynamical systems represent systems that evolve over time, which are governed by functions that determine how to transition from one state to the next. Dynamical systems can model population growth, the motion of a swinging pendulum, and the growth of bank accounts. The study of dynamical systems includes associated characteristics, such as attractors: points which the surrounding regions tend to over time. For this project, we are interested in planar dynamical systems and their associated curves, such as isoclines and critical curves, which can reveal where the behavior of a system transitions.

Isoclines and critical curves are defined by zeroes of equations involving derivatives and determinants. For some models, these curves can be found via analytic manipulation. However, for other models, these curves are analytically intractable. In these cases, simulation can find approximate solutions. For example, attractors can be approximated by computing the eventual destination of many initial conditions in a system.

Our work expands on `dsmodels`, an R package developed at Trinity for simulating and visualizing dynamical systems. The `dsmodels` tool already used simulation to find attractors and their surrounding regions, but could only visualize isoclines or critical curves that had been solved analytically. We extend `dsmodels` to approximate these curves by finding the boundary between related regions. For instance, `dsmodels` can approximate the isocline by simulating the increase or decrease of specific variables and uncovering the transition between these regions.

To validate this approach, we explore known planar models, such as the Ricker and Logistic models, as well as models with conjectured but unproven properties, such as Hollinger-type maps and the Cournot duopoly model. We show that the curves `dsmodels` creates are sufficiently precise to be used in computing derived results. Notably, the usability and accuracy of `dsmodels`' approximations uncovered errors in published research on Hollinger-type maps.

Improving Mental Health One Community at a Time

Melanie Littell*, Jane Childers

My summer internship at Connections: Individual and Family Services, a non-profit dedicated to supporting at-risk youths and families in their community, was a transformative and enriching experience. Working with enthusiastic individuals devoted to their work has deepened my understanding of challenges faced by vulnerable populations and the critical role of compassionate intervention, which has inspired me to continue striving to make a positive impact in people's lives.

Throughout my internship, I had the incredible opportunity to work closely with the counseling department, which proved to be invaluable experience. As part of my role, I had the privilege of shadowing experienced counselors and actively participating in counseling sessions. This gave me firsthand insight into the therapeutic process and allowed me to witness the profound impact that mental health counseling can have on clients. In addition to this, I also visited schools and helped teach the Positive Action Curriculum with the Prevention department. This opportunity allowed me to contribute to the personal development of many young individuals, empowering them to make positive choices and develop life skills. Moreover, I actively assisted in record keeping, ensuring accurate and organized documentation of services, and participated in community outreach initiatives to raise awareness about Connections and its services. This provided me with a comprehensive understanding of the essential administrative work required in the non-profit sector.

Overall, my internship at Connections was a well-rounded and enriching experience. It solidified my passion for helping others and diversified my continuously developing skill set, helping me form a holistic perspective of mental health. Through teaching the Positive Action Curriculum, shadowing counselors, and engaging in administrative tasks, I not only contributed to the organization's mission of supporting at-risk youth and families but also gained valuable insights that will undoubtedly shape my future endeavors in the field of social services.

The Impact of Fungal Endophyte Inocula on Native and Invasive Grass Measures of Fitness

Grace Magavern*, **Coby Wellman***, **Joslyn Boyer***, **Robin Gemanaru***, Kelly Lyons

Fungal endophytes exist in the tissues of every plant species surveyed; however their physiological impacts are poorly understood. Grassland ecosystems are in peril due to invasive species, habitat destruction, anthropogenic disturbance, and climate change. Effective grassland conservation and restoration requires an understanding of the role of microbes. Indeed, mutualist or pathogenic fungal endophytes may be useful as restoration inocula to favor more desirable grass species.

We employed a multifactorial experiment with four grass species and five fungal treatments applied in three concentrations to assess the effects of field collected fungal isolates on grass species fitness. The experiment included ten replicate plants for each treatment combination (52) for a total of 520 experimental units. The grass species utilized in this study include two native grasses, *Bothriochloa saccharoides* (silver bluestem) and *Bouteloua curtipendula* (sideoats grama), and two non-indigenous, invasives *Bothriochloa ischaemum* (King Ranch Bluestem) and *Dichanthium annulatum* (Kleberg Bluestem). The five fungal treatments consist of four different fungal isolates and one control group. The fungi selected were the most common isolates from field collected grasses across native and exotic species in Central Texas; these species are currently identified based on morphological characteristics while we await DNA sequencing results. The fungal endophyte isolates were grown in bulk and applied to individual plants at three different concentrations, which were back calculated based on dried mycelial mass. Plants were harvested in mid-July and above and below ground dry mass was assessed. Plants were also assessed for the presence of fungal endophytes using microscopy to determine whether the endophytes we introduced effectively colonized the roots. By comparing the impact of each fungal isolate on each species of grass, we can begin to determine whether the endophytes have potential to be used in grassland restoration.

Funding Source: Hixon Summer Undergraduate Research Fellowship, Murchison Fellowship, USDA in collaboration with the National Center for Appropriate Technology

The Center of Conversation: A Conscientious Approach to Business in Downtown San Antonio

Cristian Martinez*, Jacob K. Tingle

This summer, I had the pleasure of interning with the nonprofit Centro San Antonio, or more simply known as Centro. Centro is a placemaking organization that spearheads many initiatives within Downtown San Antonio from *Art Everywhere* and advocacy work to *Mainstreet Business Support* and keeping downtown clean and safe. My internship through the ALE summer program allowed me to transition from a part time federal work study employee during the spring to a full time intern available to take on larger projects. I was able to continue utilizing my digital literacy skills from my past position at Centro, while also taking on more unique challenges.

The fantastic thing about working with Centro more intensively is the transformative experience from more ambitious and thorough projects. I worked closely with my supervisors, Kailey, our Mainstreet Navigator, and Connie, our Tactical Planning Coordinator, to consolidate all the materials and information necessary to update our contact information on mainstreet businesses and our website's *Available Retail Space* resource. I was able to work outside of my comfort zone by engaging stakeholders through a physical survey and utilizing unfamiliar online tools such as the website builder, Elementor, while also employing my substantial experience in other areas like Excel and digital research. My time working with the outstanding Centro staff has allowed me to walk away with a transformative experience and new proficiencies. The insight I have gained into how to navigate first impressions, detect subtext, and make effective conversation is something I will continue to carry with me in my future endeavors.

More than News: A plethora of Opportunities at the San Antonio Report

Monica Martinez*, Jacob K. Tingle

During the summer I worked as a business intern for the San Antonio Report under Chief Operating Officer Jenna Mallette through the Trinity Arts, Letters, and Enterprise (ALE) program. The San Antonio Report is a nonprofit news organization that was founded in 2015 to inform the San Antonio community about issues and highlight perspectives from community members that other news outlets don't recognize. I was interested in this experience because I am a news reporter for the Trinitonian and a prospective business major. With the opportunity to work for the San Antonio Report, I witnessed how business degrees are used in the professional world and how journalism and business connect.

My internship involved learning how to access data through programs such as Salesforce, Broadstreet, and Mailchimp to assist the business partnership manager and the membership and audience engagement manager with recording data about subscribers and members of the San Antonio Report. I also had the opportunity to use Waymark, an Artificial Intelligence (AI) video creation tool, to see if it would be useful to the business team for future TV advertisements. Once the video was made through Waymark I changed the photos and color scheme to create a video that more closely aligned with the San Antonio Report brand. While we didn't end up using the software ourselves, it's fascinating to see how AI is used professionally. In addition to helping with day-to-day operations, I also completed a personal project. During my time with the San Antonio Report, I researched using new social platforms for advertising such as Nextdoor and LinkedIn.

This internship was my first professional job. At the beginning of the school year, I couldn't imagine spending my summer away from home and my friends. While being apart from home was difficult, I am grateful to have had this opportunity. I have seen what it can be like to work in a professional environment and work with software that is used by many businesses. I learned about the importance of communicating what I want out of an experience, rather than assuming that the outcome will lead to what I want.

Funding Source: Arts, Letters, and Enterprise Program

A Deep Learning Approach to Gene Function Prediction

Cole McGuire*, Bethany Strunk, Matthew Hibbs

The field of bioinformatics seeks to use computer algorithms and machine learning to aid in our ability to interpret biological data and increase the rate at which we make novel biological discoveries. Over the past two decades, there have been many attempts to use machine learning to predict gene function in *Saccharomyces cerevisiae*, or baker's yeast, using mitochondrial organization as a model system. While these past methods were successful, newer machine learning methods may demonstrate even better results. This summer, I created a model of gene function prediction that uses a neural network to predict a gene's involvement in multiple biological processes simultaneously.

Neural networks are a machine learning model that attempt to learn patterns in data by simulating how neurons in our own brain function. Neural networks learn these patterns by making predictions on training data, input data with known labels, then updating its parameters based on whether the network's prediction is correct. While previous models for gene function prediction were limited to predicting a gene's involvement in a single biological process, neural networks are able to predict a gene's involvement in multiple biological processes simultaneously. Furthermore, we found that predicting a gene's involvement in multiple biological processes simultaneously improves the accuracy of predictions compared to previous models of gene function prediction that only predict a single biological process.

In addition to comparing my model against past methods of gene function prediction, I sought to verify my model could make novel biological discoveries by testing my network's top predictions in the laboratory. Experiments are underway to test the functions of genes with unknown functions that my network predicts are involved in mitochondrial organization.

Enhancing the efficiency of FRET using surface plasmons waves on gold nanogratings

John McMahon*, Katherine Dixon, Nathaniel Warpmaecker, Jennifer Steele

Our lab is attempting to enhance the efficiency of Förster resonance energy transfer (FRET) by exciting surface plasmons on gold nanogratings. FRET is a nonradiative energy transfer between a donor and a fluorescent acceptor molecule. The efficiency of FRET strongly depends on the distance between the donor and acceptor molecule, the overlap of emission and absorption spectra, and the relative orientation of the donor and acceptor dipole moments. Surface plasmons are the oscillations of electrons at the interface between a metal and a dielectric. The solutions of Maxwell's equations for a smooth metal film do not allow for free space photons to excite surface plasmons. However, metal surfaces with nanogratings allow for the coupling of free space photons and plasmons. These metal nano gratings give nearby fluorescent donor molecules an additional pathway to transfer energy to the acceptor fluorescent. Our lab suspects that this enhancement varies with the distance of the donor and acceptor from the grating. To test this, we are developing a protocol to use DNA as scaffolding to precisely position the donor and acceptor in relation to the grating. The goal this summer was to attach the fluorescent donor molecule to DNA and look for evidence of fluorescent enhancement as a function of distance away from the grating.

Investigating the effect of cyclization and hydrophobicity of lipopeptides on antibacterial activity and toxicity

Thomas McPherson*, Nathalia Almeida

Multi drug resistant bacteria has become an increasingly serious problem with more than 35k deaths in the United States per year. This has led to the need to develop novel antibiotic treatments with minimal risk of causing resistance. Lipopeptides, which are formed by a short amino acid sequence with a hydrophobic alkyl tail attached to the N-terminus, have shown potent antibacterial activity associated with bacterial membrane disruption and are generally slow to develop resistance. Still, the biggest limitation of these compounds is the hemolytic activity. Our goal is to study the effect of cyclization, hydrophobicity, and charge on antibacterial activity and toxicity. We used Fmoc solid-phase peptide synthesis to create a small library (9 lipopeptides) of positively charged linear and cyclic peptides with differing hydrophobicity in order to test their *in vitro* antibiotic activity as well as cytotoxicity in mammalian cells. The cyclization was performed via disulfide bond. We confirmed the identity using HR/MS, purified using RP-HPLC, and the purity was confirmed by analytical HPLC. Future experiments include characterization by NMR and determining relative hydrophobicity by HPLC to study how hydrophobicity is related to antibacterial activity and cytotoxicity. Other future biological experiments include antibacterial assays and cytotoxicity in mammalian cells to determine their respective IC_{50} . Some of these molecules may not be active on their own but can still alter the permeability of bacterial membranes being good candidates for antibiotic adjuvants, so another future experiment includes checkerboard assay to investigate synergistic activity with existing antibiotics. Using this strategy can help with the problem of toxicity since the concentration required for synergistic activity is lower. A better understanding of the balance between charge and hydrophobicity of these lipopeptides will help us to develop more specific antibiotics (low toxicity) to overcome the problem of bacterial resistance.

Funding Source: John Burke Chemistry Research Fund

Queer Emerging Adulthood: LGBTQ+ Youth's Experiences Moving Out and Gaining Independence

Anna Miller*, Amy Stone

The shift from childhood to adulthood is a life stage that is often filled with uncertainty, discovery, and growth. Existing bodies of literature on youth development examine this time as a distinct period of life: emerging adulthood. Relatively little attention has been paid to the experiences of LGBTQ+ youth in this regard, as the bulk of work on emerging adults remains hetero- and cis-centric. This literature also largely focuses on college students, leaving out experiences of emerging adulthood of non-college students. This paper asks: How do queer youth understand moving out from their parents' home as a component of emerging adulthood?

The data in this paper is pulled from the Family, Housing, and Me (FHAM) project, a longitudinal study of 83 LGBTQ youth (ages 16-19) living in California's Inland Empire or South Texas who were dependent on others for their housing at the start of the study. This paper analyzes initial and follow-up interviews with FHAM youth, one from the summer of 2022 and one from the summer of 2023. Topics covered in the interviews included family life, housing history, and LGBTQ identity. In this paper, we focus on data from youth who do not live with their parents, both in student housing and in other independent living arrangements.

Preliminary findings indicate that youth in this study experience moving out as a step towards independence. Moving away from parents allows youth to exercise control and autonomy over their everyday lives, as they have more freedom in managing their schedules, transportation, relationships, and lifestyles. Leaving home is an opportunity for youth to experience "personal growth," including queer identity exploration and LGBTQ+ community-building. For LGBTQ+ youth, this is often a welcome shift from previous housing environments characterized by a lack of familial support and personal autonomy.

Be a Swiss Army Knife: A Summer of Growth at San Antonio Sports

Samantha Miller*, Jacob K. Tingle

This summer, I had the opportunity to intern with San Antonio Sports (SAS) located at the Alamodome in downtown San Antonio. My marketing internship through the ALE program focused on learning marketing techniques as well as understanding how to manage, operate, and work as a team in a small organization. SAS is a non-profit with the mission of transforming the San Antonio community through the power of sport. By making sports and fitness classes accessible and free to citizens of San Antonio, SAS creates an equal opportunity to start living a healthy life no matter your physical or economic limitations.

As a marketing intern, I helped brainstorm and create social media posts for multiple platforms, discussed plans for rebranding one of SAS's largest programs, and I had the chance to attend meetings where I was asked to share my thoughts on specific topics (e.g., brand perception, improvements to programs, etc.). At the beginning of my internship, I created four learning objectives to structure my experience at SAS, and can proudly say that I completed each of them throughout my experience.

Even though I was hired as a marketing intern, I quickly realized that everyone in the organization wears a plethora of different hats. As I helped the operations department, I learned the *do's* and *don'ts* of event planning. While helping the youth department, I was able to interact with the community and see who our target audience is. Both of these departments helped me expand my marketing knowledge and add skills to my professional *Swiss Army Knife*. I originally applied to this position because the description combined my two passions: sports and creativity. After my experience, I learned that San Antonio Sports is an organization that actively pursues positive change in my community, and encourages growth in every aspect.

Kindled Spark to Burning Interest: Prescribed Fire Mapping and Web Application in ArcGIS

Taylor Miner*, James Shinkle

The Nature Conservancy is a trailblazing conservation non-profit organization that, through land acquisition and community outreach, protects the environment on an international scale. My internship project was as the sole GIS intern with two main expectations: the first to become familiar with Environmental Systems Research Institute (ESRI) products and systems, and the second being utilizing these tools to create prescribed fire maps for the internal fire teams. ESRI systems include the ArcGIS suite of products that are used to create compelling maps and applications to visually display/interact with data.

As a GIS intern, I was given many opportunities to expand upon my rudimentary GIS knowledge through complimentary online ESRI training modules and in-person workshops. I learned how to create maps on many applications, such as ArcGIS PRO and ArcGIS Online, and additionally create web applications to make this data more accessible. While I worked virtually for a majority of my time, there were many occasions to come into the office and network with professionals in an array of fields. This was made even easier by weekly group chats between interns and TNC members, such as Coastal Restoration Manager Kathy Sweezy. I was invited to preserves and private lands to see firsthand the result of prescribed fires and other field work, which helped me realize the importance of my work making these much needed maps.

My time at TNC was an enlightening experience that, through meaningful work and a culture grounded in respect and care, cemented my professional goals of conservation. Alongside my main tasks, I also gained a great deal of interest and experience that went beyond my job description. This internship kindled a genuine interest in working with GIS which I look forward to continuing to improve upon.

Funding Source: Arts, Letters, and Enterprise Program

Family Housing and Me Project: Analyzing the Relationship between LGBTQ+ Siblings

Ryann Moos*, Amy Stone

What role do siblings play in the lives of LGBTQ+ youth? And what happens if the sibling is LGBTQ+ too? This paper will focus on the role of queer siblings as important non-parental figures in the lives of queer youth. More specifically, this study will illuminate how LGBTQ+ siblings impact the experiences of LGBTQ+ youth within a cisheteronormative family structure.

This summer research project works as a component of Dr. Stone's larger project, Family Housing and Me (FHAM). The FHAM project is a longitudinal study of lesbian, gay, bisexual, transgender, and queer (LGBTQ+) youth that is funded by the National Science Foundation. This project examines how non-parental relatives' support shapes the housing stability and safety of 83 LGBTQ+ youth participants in South Texas and the Inland Empire of California. This paper focuses on 26 youth who have an LGBTQ+ sibling or siblings. Many of these participants and their siblings identify as trans, nonbinary, genderqueer, or gender questioning.

Queer siblings hold a unique sense of intimacy that stems from both a queer-specific and sibling-specific understanding of one another. This connection is solely attributed to this type of bond and is not easily replicated by other family members. Additionally, this intimacy is heightened by shared gender identity or gender experience between the siblings. This paper will uncover how LGBTQ+ siblings support and interact with the FHAM youth within their cisheteronormative family environment. By coming out first, offering protection against unsupportive parents, or affirming their siblings' gender, LGBTQ+ siblings have a strong influence upon queer youth.

This paper will be one of the first to address the importance of an LGBTQ+ sibling within an LGBTQ+ individual's life, as there is no existing literature on this topic. It will act as a pathway into deeper studies regarding combating cisheteronormativity within the family structure.

Niños Sin Fronteras: Advocating for the rights and well being of young people seeking asylum in the United States

Cinthia Morales*, Rocio Delgado

This poster describes my experience as an intern at Kids in Need of Defense (KIND). KIND is a nonprofit organization focused on providing legal aid and social service programs to unaccompanied minors migrating to the United States. An unaccompanied child is an individual who: (a) has no lawful immigration status in the United States; (b) has not attained 18 years of age; and (c) with respect to whom---(i) there is no parent or legal guardian in the United States; or (ii) no parent or legal guardian in the United States is available to provide care and physical custody. For years, the US Immigration System has been the center of debates, with our attention focused on the news, rather than the issues at our hands such as children crossing the borders alone. Many are unaware of the exhausting and difficult battle a child goes through to obtain a better future for themselves.

It is the organization's mission to grant access to the proper resources to ensure the equity and protection of an unaccompanied child. They provide pro-Bono legal representation while supporting the child's needs to ensure they never face an immigration court without an adult. My duties as an intern included: (a) familiarizing myself with immigration law in terms of the ways to seek asylum for children, (b) translating court documents and forms required for documentation, (c) scheduling and conducting intakes with clients, and (d) becoming knowledgeable about the databases KIND utilizes to keep track of their clients' information.

My journey at KIND was a developmental process that began with training focused on understanding the work needed to conduct one-on-one interviews with clients to the opportunity of being able to hand clients their long-awaited green card. KIND is an organization making a change to this field one child at a time.

BFit - Merging the gap between business and product

Marcos Morales, Utsavi Joshi, Jose Hernandez, Kevin Han, Carmen Aramanda

The Summer Accelerator Program, a prize given to all finalists in the Stumberg Venture Competition, provides students all manners of opportunities in learning, networking, and resource gathering for the proper tools and mannerisms required to start a business. Attending professional networking and business events, having lifetime tours with entrepreneurship centers and incubators, and learning from experts in the various fields of entrepreneurship, we have been granted an opportunity to learn the insights of what it takes to make a profitable and successful business.

Within the span of the accelerator, we've focused our efforts in understanding and conceptualizing how we can take our product idea and make it into a profitable business. Understanding sales, marketing, production, and audience, we've gained great insight on what it takes to take a product or innovation to the market, and how one can translate the language of technology to the language of business. In our presentation, we will talk about our findings of what it takes to grab a innovative or new product / technology, and make a proper business plan around it. We will communicate about the financial side of this process, as well as the marketing and sales side that is important in order to orchestrate a successful business.

Funding Source: Olin Endowment

Effects of Small Colony Formation on the Swimming and Feeding Performance of Choanoflagellates

Zachary Moyer*, Hoa Nguyen, Ricardo Cortez, Lisa Fauci, Mimi Koehl

Choanoflagellates, the closest living relative to animals, are unicellular eukaryotes that can form multicellular colonies. Each cell has an ovoid body and a single flagellum surrounded by a collar of microvilli. A single cell swims by waving its flagellum, which also creates a water current that brings bacteria to the collar of prey-capturing microvilli. In this project, we examine the effects of small colony formation on the swimming and feeding performance of choanoflagellates. The simulation uses a regularized Stokeslet and Segments framework to model the cell, by placing points on the body and flagellum while segments are placed on the collar. Replacing the points on the collar with segments has significantly reduced computational time and memory usage, allowing for more cells to be added to a colony.

To study their feeding and swimming behaviors, we calculate the inward flux of fluid into the collar of each cell and the translational and rotational velocities of the colony due to the prescribed flagellar motions. We find that reducing the angle between cells in a small colony increases the average speed of the colony and the inward flux of each cell. For a two-cell colony, an increasing difference in their initial flagellar phases causes a linear increase in velocity and a difference in inward fluxes between the cells. In general, the effect of the flagellar phase on the colony is only significant when all the flagella beat on the same plane. On-going simulations with randomized flagellar phases, planes, and frequencies for colonies between two to four cells will give insights into how initial cell positions within a colony affects feeding performance.

Funding Source: National Science Foundation, Trinity - Tulane - Berkeley Collaboration (TTBC)

Parameter Estimation of the Mark-Houwink-Sakurada Equation for the Characterization of the Molecular Weight of PEG/PEO-Based Polymers

Ezekiel Negrete*, Dany Munoz-Pinto

Molecular weight (M) characterization plays a fundamental role in understanding the structure and properties of macromolecules in various scientific and industrial fields. Viscometry, a well-established technique, offers a powerful tool for determining the molecular weight of polymers and biomolecules. Compared to other techniques like gel permeation chromatography and light scattering, viscometric analysis is the most cost-efficient technique that can be easily adopted in most laboratories. This study utilizes the polymer-solvent relationship of the Mark-Houwink-Sakurada (MHS) equation, $[\eta] = K M^{\alpha}$, to correlate the molecular weight of poly(ethylene glycol)/poly(ethylene oxide) (PEG/PEO) and the inherent/reduced viscosity of aqueous-based polymer solutions as it relates to the polymer's intrinsic viscosity, η_{sp}/c . PEG and PEO are polymers extensively utilized for drug delivery and biomedical applications, but the characterization of viscosity of aqueous solutions has not been carefully characterized or reported in current literature. To calculate the parameters K and α , seven polymers M_s with estimated values of 3.4, 6.0, 10.0, 20.0, 150.0, 250.0, and 325.0 kDa were used at nine different concentrations. Using the intercept of the curve between the inherent/reduced viscosity and the polymer concentration for each M the intrinsic viscosity was estimated. Using the linearized form of the Mark-Houwink-Sakurada equation, the parameters K and α were estimated for PEG/PEO. Our current results will facilitate the estimation of the M of unknown PEG/PEO mixtures by measuring the viscosity of aqueous-based solutions.

Funding Source: National Science Foundation

The Grim Anatomy of Fascism: *Tötungsbereitschaft* and the Human Subject in *Der Begriff des Politischen*

Jordan Nelson*, Nicholas Reynolds

After almost a hundred-year distance between modernity and Nazi Socialism, we feel, inappropriately, distanced from complete authoritarianism in the West. Critical thought, as Theodor W. Adorno attests, champions progressive tendencies towards real humanity and freedom, even though it appears powerless against fascism's great historical trend. Conversely, Carl Schmitt's corpus lends its popularity to denouncing liberalism. Although Schmitt a not a practitioner of authoritarianism's real-world policies, his Nazi affiliations lead some scholars to easily dismiss his writings without merit. Just as easy, however, is to neglect anti-liberal or authoritarian texts to, in turn, allow similar rhetoric to reenter politics.

I offer a reading of Schmitt's *The Concept of the Political* (*Der Begriff des Politischen*) with specific attention to the German word *Tötungsbereitschaft*, translating to "the readiness [or] preparedness to kill." I examine the dialogue between Schmitt and German thinkers, including Walter Benjamin, Hannah Arendt, and Adorno, on the human subject under fascism. I argue that in *Tötungsbereitschaft*, the human subject becomes an object of statehood, ultimately leading to the human subject seeking out objects of perpetual aggression. To conclude, I review modern applications of *Tötungsbereitschaft*.

Trinity Summer Accelerator Program- Understanding the value of an effective business model

James Ogunrin*, Carmen Aramanda

The Trinity Accelerator program takes you through the key aspects of starting a business, including undertaking customer discovery, developing a business network, setting goals for your business, understanding your options regarding establishing a legal entity for your business, understanding project management, developing operating agreements, legal agreements, and other legal contracts, setting a sales strategy, and financial modeling. My company, The Beast Collection, is a lifestyle apparel company striving to provide customers with the finest high-quality athletic wear, fitness products, and accessories. Our company's purpose is to empower young adults struggling to find the motivation and consistency in their fitness and health journey by building a community. As a startup company, the foundation of our business plan is paramount to the success and longevity of the company. The value of establishing key components of a business, such as a business model canvas, value proposition canvas, competitor analysis matrix, and SWOT analysis, will ultimately propel a more effective and sustainable company.

Throughout the program we learned the importance of having a strong set of founding principles upon which to build your company. Every startup company is tasked with creating a unique marketing strategy, which starts with the mission statement and vision statement. A compelling mission and vision statement can create a strong brand identity and differentiate the company from its competitors. It communicates the company's unique value proposition, core values, and long-term aspirations, helping to establish a distinct image and reputation in the marketplace. Once a business understands its foundation, it must next understand the external environments, such as threats, opportunities, and market share. This poster will show my business model in relation to research conducted in the Summer Accelerator Program directed by Carmen Aramanda.

Non-Profit Advocacy: The Busy Bees Build A Community

Chukwunonyelum Okoye*, Norma Elia Cantú

This summer, I had the opportunity to intern with the Esperanza Peace and Justice Center. I was not well-acquainted with the non-profit before the internship, but their mission statement, dedicated to fostering community and helping those without access to resources, drew me in. Because I did not know much about the Esperanza, I did not know what to expect. I knew I would work with San Antonio's Westside community, but I did not realize how deeply involved I would get in just a few weeks.

Esperanza creates places for the community to gather and feel safe. My internship showed me the inner workings of how those spaces become realized. It involves many hours being put into community gardens so that the community can have plants and vegetation. It means creating lesson plans for community classes so everyone becomes more involved and educated on the local government. Whether it was painting a banner for an event or participating in VIA's open comment to prevent the displacement of the Westside members due to the new Scobey development, every job was for the benefit and enjoyment of the community.

Overall my internship has taken me out of the Trinity bubble and into a more vibrant San Antonio. I now have organizational skills and have learned how to take the lead on projects that I am passionate about. Not only that, but I have the research skills necessary to see those projects through.

The Study of the Inflammatory Response of Human Astrocytes Using Multi-Interpenetrating Polymer Networks

Wendy Ortega*, **Devon Bellamy***, **Meagan Mckee**, **Swathisri Ravi**, **Andrea C. Jimenez-Vergara**, **Dany J. Munoz-Pinto**

Hydrogels based on multi-component interpenetrating polymer networks (mIPNs) are one of the most promising tissue engineering scaffolds that could closely resemble key characteristics of native tissues. These hydrogels allow for the control and tuning of mechanical and biochemical properties and facilitate cell-matrix interactions, creating a microenvironment that supports in vitro cell culture. In this project, we fabricated hydrogels made of hyaluronic acid (HA), collagen type I (Col I), fibrin, and poly(ethylene glycol) diacrylate (PEGDA). HA was selected because this polysaccharide is the most abundant component in the central nervous system (CNS). Col I was selected due to its self-assembling properties and because it provides similar biochemical cues as Collagen IV, the most common type of collagen present in CNS tissue. Fibrin was added to the network to modulate the inflammatory response of human astrocytes, and PEGDA was introduced to provide mechanical stability to the hydrogels and prevent cell-mediated degradation. By creating mIPNs composed of these macromolecules, we matched the mechanical performance of human brain cortex tissue for different fibrin levels and achieved negligible cytotoxicity. The mechanical performance of the engineered scaffolds were characterized using dynamic mechanical analysis. The presence of the individual networks and their microarchitecture were qualitatively evaluated using confocal laser scanning microscopy (CLSM). The developed biomaterial platform will be used to assess the effects of the abnormal deposition of fibrin in cortex tissue typically found in human pathologies, including Alzheimer's and Parkinson's disease and traumatic brain injury.

Well and Worthy: Dare to Redefine Women's Wellness

Sofia Ortiz, Ashleigh Reese, Mitch Overton*, Carmen Aramanda

Well and Worthy is a startup company centered on women's health and wellness that is developing the world's first cycle syncing app. In today's current health climate, women are excluded and underserved - disproportionately dealing with pain, stress, and being strung along in a journey trying to find the meaning of health. Our goal is to help women in ways that other health apps miss, allowing for a new, empowered approach to women's health, where the women are treated as they should be - as a whole, unique being.

Our app gives women the resources to re-understand the natural processes of their bodies and to optimize them. We take a personalized and holistic approach to women's wellness by using the cutting edge science of female hormones to recommend lifestyle changes based on each woman's individual needs and challenges, to help them achieve their wellness goals.

This summer, we have been a part of the Stumberg Accelerator program after competing last spring in the pitch competition and winning a stipend for 5k to help fund the creation of our company. As a part of this program, we have had the opportunity to learn from a number of guest speakers covering a variety of topics: legal advising from lawyers, marketing and advertising from CMOs, and basic entrepreneurial skills from established entrepreneurs. We have also had networking events and opportunities to learn and engage with the local San Antonio startup community, which has allowed us to grow as entrepreneurs, and practice skills we've learned in the classroom.

Leveraging Steam Game Reviews for Enhanced Recommendation Systems

Seth Owirodu*, **Quang Le***, Sheng Tan

In this project, we present the development of a game recommendation system that leverages user reviews from the popular gaming platform Steam. Our objective is to enhance the existing recommendation algorithms by identifying specific game characteristics that users appreciate. The project is a collaborative effort between myself, Quang Le, and Dr. Sheng Tan.

To achieve our goal, we employ Language and Web Scraping techniques, to analyze the content of user reviews. By extracting meaningful insights from the reviews, we aim to identify the key aspects that contribute to user satisfaction.

The extracted information on user preferences and game characteristics will then be used for the recommendation system. By utilizing these insights, we aim to provide more personalized and accurate recommendations to users. Ultimately, our project aims to advance the recommendation systems and contribute to the improvement of user experiences.

We Are Family: The Social and Theological Impact of Matthew's Genealogy (Matt 1:1-17)

Caroline Parish*, Kim Bauser McBrien

The beginning of the Gospel of Matthew claims to present "an account of the genealogy of Jesus" (Matt 1:1, NRSV), beginning with Abraham. The list is largely patriarchal but does, surprisingly, include five women (including Mary). It is also the genealogy of Joseph, despite Jesus's not being genetically related to him. There are notable similarities between the first four women in the genealogy that might explain their inclusion in this messianic family tree. All of them are non-Israelites, whose unconventional sexual encounters lead to their and their children being adopted into the line of Abraham. When read alongside Jesus's relation to this genealogy, one could see their inclusion as precedent for Jesus's own adoption into Joseph's family line. This research project will explore these aspects of the genealogy and their relation to Matthew's broader understanding of Jewish identity and the inclusion of Gentiles in early Christian communities. This project will be published as an article for Bible Odyssey.

Needs and Assets Assessment for Bexar County Community Care Coalition

Cecilia Parker,* Alfred Montoya, Monica Dyer

This project is a needs and assets assessment for a local coalition of organizations serving the unhoused community in San Antonio. The project will determine, generally, what resources and services are currently available for the unhoused, what barriers there are to accessing such resources and services, and what limiting factors constrain the partner organizations in expanding access to said resources and services. The project also explores what the client/user perspectives/experiences are regarding the partner organizations, and what everyday practices and needs of the client/user complicate delivery of resources and services by the partner organizations. The data obtained from this project will aid in the development of a report of these barriers to submit to the City of San Antonio and South Alamo Regional Alliance for the Homeless to advocate for a medical needs shelter in Bexar County. The report will include case studies of deidentified clients via informal interviews and participant observation. It will also examine case studies of successful medical respite programs in other cities. Furthermore, the information presented in this project can be used to make recommendations for a comprehensive and effective medical respite in Bexar County. The methods included an analysis of the literature, interviews with both clients and providers, and a case study of the Corazon Ministries harm reduction and resource center. The most prevalent barriers observed fell along individual, organizational, and interpersonal lines. The issues that proved to be the most hampering were the ones regarding health management, employment and other benefits, shelter, discrimination and stigma, and immobility.

Recreating the Artpace Library Through the Dewey Decimal System

Ruth Patterson*, Kate Ritson

This summer I had the opportunity to work as an archival intern at Artpace, a San Antonio-based art foundation. Artpace is notable for its International Artists-in-Residence program, in which a guest curator selects a Texas, United States, and International artist to create a body of work for Artpace in seven weeks. Additionally, Artpace is a supporter of the arts locally, hosting events such as Chalk It Up and community workshops taught by artists.

As the archives intern, I was responsible for cataloging and organizing the Artpace Archive Resource Library according to the Dewey Decimal System. Artpace's library is available to the public and contains over 1300 books, largely concerning art and artists. It was not organized in an accessible or comprehensive manner. I was tasked with cataloging the books according to the Dewey Decimal System, which ensured that materials were coherently cataloged for internal records purposes and public accessibility. I was guided in my research by OCLC Classify, a website focused on library classification systems. Another critical resource I used was the official Dewey Decimal System manual. It is my intention to complete this project by the end of my internship. Additionally, I worked on smaller projects, including adding photos and film negatives to Artpace's digital archives, assisting at events, and collecting valuable information for Artpace's grant writer.

Overall, my experience at Artpace was intellectually fascinating and nourishing to my professional development. Through attending regular meetings and working alongside staff, I developed a more confident grasp of the professional environment. I learned about the inner workings of an art foundation and saw the processes that create public-facing events and exhibitions. These experiences honed my ambitions, and I see myself engaging more keenly with my art history coursework and exploring career and higher education opportunities in the arts.

Funding Source: Arts, Letters, and Enterprise Program

How Children Learn Verbs When Faced with Referential Ambiguity

Faith Perry*, Jane Childers

Verb learning is difficult for young children because it requires “word to world” mapping (Gleitman & Gleitman, 1992). Multiple events could be co-occurring in a single scene and a child is tasked to decipher which set of elements are linked to the verb. For example, a parent could be cooking steak on the stove and cutting vegetables simultaneously; the child has to reason as to which action refers to “cooking.” We simulated this experience by showing 3 ½- and 4 ½-year-olds (n=28) 3 events in each trial and presenting a new verb. Across 3 trials, 3- and 4-year-olds were able to focus on the repeated action and extend the verb (ps <.05). In Study 2, the same-aged children (n=62 to date) were shown a repeated agent across trials (facilitating structural alignment), six learning trials with varied agents (more instances for statistical learning), or both a repeated agent and six learning trials. Preliminary analyses suggest children in the structural alignment condition could extend the new verbs, and may perform better than those in the statistical learning condition; data collection in progress. These studies are important for understanding cognitive processes that may underlie a key task, verb learning.

Understanding Interactions Between Affect and Identity in First-Year Engineering Students

Alyndra Plagge*, Danielle Usinski, Emma Treadway, Jessica Swenson

Previous research has shown that students with strong engineering identities are more likely to complete the major and pursue a career in the field of engineering. Affect and identity each play an important role in students' experience of engineering although previous research is unclear on how they interact with one another. For the purpose of this study, we defined affect as the emotions, attitudes, beliefs, and values a student holds in regards to math, science, and engineering. We interviewed students in their first year of an engineering program at the end of the fall and spring semesters in order to understand the interaction between affect and engineering identity. In this comparative case study, we examined the interviews of students who plan on leaving engineering with those of students who are continuing with engineering. The students leaving engineering had strengths in some areas of engineering identity but were weaker in others, making it hard to predict who would not continue with engineering after the fall semester alone. Students who identified one of their other identities as conflicting with engineering values and beliefs tended to have weaker engineering identities. Understanding the interaction between affect and identity can help accurately understand the engineering identity of students. The results of this research can be used to propose possible ways for educators to increase the retention of engineering students.

Animation Stylization with Graph-Based Autoencoder

Matvei Popov*, Matthew Hibbs

Character motion stylization is a big and time-consuming part of modern animation production pipelines. In order to apply different styles to animation to make it more cartoonish, realistic etc., animators have to manually adjust every frame of the animation. This takes long amounts of time and makes the animation production process slower and more expensive. We propose a deep learning based technique that automates the process of character motion stylization, in order to improve speed and efficiency of modern animation pipelines.

We aim to improve this problem using an autoencoder, a type of computer program often used in the field of artificial intelligence. It works like an artist who first sketches a detailed scene, then simplifies the sketch into basic shapes, and finally uses those shapes to create a new, stylized version of the original scene. In this case, the Graph-Based Phase Autoencoder is taking the 'skeleton' of the animation (like the basic structure of how a character moves) and uses it to understand and recreate the animation. The 'graph' part refers to this process of mapping out the skeleton structure within the program.

We train our autoencoder model to apply the squash-and-stretch, and overlapping animation styles onto different types of 3D character motion-sequence animations, on a custom developed dataset.

Funding Source: Murchison Fellowship

The Foundation for a Strong Future: My Internship Experience with the Holt Family Foundation

Abby Power*, Jacob K. Tingle

Through Trinity's ALE summer internship program, I had the honor to work as the first intern for the Holt Family Foundation under Holt Ventures and Family Office Partner, Meg Paulus. The Holt Family Foundation is a San Antonio-based private family foundation focused on improving the lives of those in the Bexar County area through health, education and access, arts and beautification, and economic mobility efforts. As an intern with the foundation, I was primarily responsible for researching and reporting on organizations previously offered grants as well as meeting with potential grantees.

One of my largest projects as the foundation's intern was to compile an impact report detailing the foundation's gifts given thus far in 2023. In crafting the report, I researched every organization, their mission, and the specifics of the grant gifted by the foundation. I also collaborated with Holt Family Office staff to ensure accurate reporting, created charts and graphs to display data, and prepared a presentation summarizing the impact of the foundation's gifts.

My experience with the Holt Family Office has provided me with a greater understanding of the important role foundations play in the nonprofit ecosystem of San Antonio. In developing my research and strategy skills, this internship has prepared me for my future career as a civil rights lawyer. Furthermore, by having the opportunity to learn from Meg in many different ways, I have cultivated a deeper sense of professionalism and knowledge that I will carry with me in all of my future endeavors.

Funding Source: Arts, Letters, and Enterprise Program

Bloom Where You Are Planted: My Summer with Green Spaces Alliance

Olivia Predmore*, Maranda Larsen

This summer I had the opportunity to work as the Urban Land and Water Program Intern at Green Spaces Alliance of South Texas. Green Spaces Alliance is a local non-profit land trust that sustains the natural environment and enhances urban spaces through land conservation, community engagement, and education. As an intern at Green Spaces Alliance I was able to experience the inner workings of a non-profit by sitting in on various staff meetings, observing the work done by employees, and developing my own educational programming using what I learned.

As the Urban Land and Water Program Intern I spent the summer researching and developing educational programming for the community on various topics including pollinator patches, native plants, and fruit trees. I also used my knowledge of event planning to facilitate a family day out at one of the community gardens in the Green Spaces Alliance network. I collaborated with many members of the community within the network in order to coordinate all of the projects that I facilitated.

My experience with Green Spaces Alliance and their supportive staff has given me an incredible insight into the nonprofit world, as well as skills and knowledge that will carry me forward through my education and career. I achieved my learning goal of developing stronger proficiency in goal setting, time management, and task prioritization. In addition to that and learning about nonprofit organizations and what goes into their management, I improved my interpersonal communication and organizational skills, both of which will be serviceable throughout my life.

Funding Source: Arts, Letters, and Enterprise Program

The Ethics and Legality of AI Artwork

Gaya Rajamony*, Paul Myers

AI (artificial intelligence) generated art has gained some attention in the recent months. With the emergence of tools like Stable Diffusion, Midjourney, and DALL-E, AI has reached the forefront of popular culture, copyright law, and ethical discussion. Models that allow users to turn themselves into art, like Lensa, and social media sites like TikTok that have AI filters for users to play with have brought AI art into the mainstream. Other models have been used to generate artwork for book covers and TV shows. The popularity and competence of these art programs make many human artists vulnerable to exploitation. Artwork may be used to train AI without the consent of the artists and, since training sets can be proprietary, perhaps without their knowledge. There is currently no way for artists to opt out of these datasets. The datasets themselves are also harmful, containing many images that sexualize women (especially women of color).

This paper will explore both the ethical and legal ramifications of AI artwork, along with the technology used. The technological complexity of models like Stable Diffusion make discussions of legal precedent and ethics much more nuanced. This paper will explore this through the lens of Martha Fineman's Vulnerability Theory. Her theory provides a useful framework for exploring the vulnerability inherent in the human condition, how that vulnerability is exploited, and how the legal system can protect against that exploitation. Fineman describes vulnerability as something inevitable that is shared among all humans. No one is exempt and therefore, it is essential to change systems that don't account for this and, in their inaction, allow latent exploitation.

Funding Source: Murchison Fellowship

Investigating the functional conservation between yeast and human Fig4 in yeast cell growth assays

Ashleigh Reese*, Bethany Strunk

Fig4 is a lipid phosphatase responsible for regulating the cycles of phosphorylation and dephosphorylation that occur in the lipid substrate PI3,5P2. Fig4 is able to do this through its association with the Fab1-Vac14-Fig4 protein complex. Mutations in Fig4 are linked to neurodegenerative diseases including Charcot-Marie-Tooth disorder (CMT4J), amyotrophic lateral sclerosis (ALS), and leukodystrophy. Rapamycin is a chemical that inhibits cell proliferation and growth by inhibiting the TORC1 pathway. Unexpectedly, expression of a subset of disease-related mutants of Fig4 confers a growth advantage on rapamycin at 37°C compared to wild-type or no Fig4. Each of these disease related mutants displays impaired association with the Fab1-Vac14-Fig4 complex. We propose that, in the disease-related mutations where Fig4 is dissociated from the Fab1-Vac14-Fig4, it is able to associate with other protein(s) in a context-inappropriate manner resulting in the observed growth advantage on rapamycin at 37°C. The Fab1-Vac14-Fig4 complex is conserved from yeast to humans and dysregulation of PI3,5P2 due to impaired function of this complex is generally assumed to underlie the pathology resulting from Fig4 mutations. Our data suggest that Fig4 may alter cellular homeostasis independent of its influence on levels of PI3,5P2 through association with other proteins in the cell. To begin to investigate whether the complex-independent growth advantage conferred by Fig4 disease-related mutants is also conserved in humans, we will test whether expression of human Fig4 can substitute for yeast Fig4 in *Saccharomyces cerevisiae* cells. We have developed growth assays that will allow us to test for the ability of human Fig4 to support yeast cell growth through regulation of PI3,5P2 as well as through the PI3,5P2 dependent growth advantage on rapamycin at 37°C. These experiments may offer new tools to investigate conserved roles of Fig4 in yeast and human cells.

Orchestrating Success: Behind the Scenes of YOSA

Sophia Relyea*, Carl Leafstedt

Trinity's ALE program provided me the opportunity to intern with the Youth Orchestra of San Antonio's Department of Operations and Development. YOSA is a non-profit youth orchestra program that promotes music collaboration among young musicians from diverse backgrounds. YOSA features year-round orchestras and ensembles, as well as summer camps and school partnerships. YOSA's mission is to diversify secondary music education by providing accessible, high-quality music education and opportunities to young musicians.

As a YOSA Department of Operations and Development intern, I actively participated in staff meetings, analyzed the internal database to create informative documents, and assisted in the production of YOSA events. I also conducted research on corporate sponsorship tactics and compiled information on YOSA Alumni. In addition to the work I did in the office, I worked at the YOSApalooza and YOSA invitational concerts, and YOSA Summer Symphony Camp where I assisted in coordinating rehearsals and materials for ensembles, campers, parents, and volunteers.

My internship with YOSA was meaningful to me because of my passion for equitable music access. It allowed me to gain insights into nonprofit operations while strengthening my organizational and communication skills. I learned task prioritization, and how a non-profit is funded and maintained. I also learned how to foster relationships in a professional capacity and expanded my professional network. More personally, I developed a better understanding of work-life balance and self-advocacy in the workplace. My inside look at YOSA has brought me one step closer to achieving my long-term career goal of working in the nonprofit sector, where I intend to utilize my education in psychology to facilitate emotional processing through music and art. This internship has reinforced my commitment to this path and equipped me with the practical knowledge and skills to contribute meaningfully to the field.

Funding Source: Arts, Letters, and Enterprise Program

X-Ray Observations of Hydrogen Deficient Supernovae

Jake Ridenbaugh*, Dr. David Pooley

This project is an on-going search for X-ray emission from supernovae, which are the violent explosions that mark the ends of massive stars' lives. Initial observations of supernovae from the most massive stars reveal a lack of hydrogen, which is the most abundant element in the outer envelopes of those pre-supernova stars. That hydrogen must have been cast off, either in a stellar wind or through impulsive ejections of material. When the shock waves produced by the supernova catch up with that hydrogen ejecta, the interaction could emit X-rays, which we look for. We are searching for serendipitous observations taken with the world's premiere X-ray satellites which have the target supernova within the field of view of the telescope. We then use satellite-specific software to extract spectral data and other specialized software to measure or place limits on the amount of X-ray power produced by the interaction.. This work is part of a large effort to create a comprehensive base of knowledge for the late-time behavior of supernovae from the most massive stars.

Single-Frequency Environment Exploration on Contact Transitions

Misael Rodriguez*, Emma Treadway

In the past, researchers have discovered that moving at different frequencies can change people's ability to distinguish between differences in stiffness, mass, and damping. In this work we extend upon previous work by Fu et al. (2020) that predicts how moving at different single frequencies affects just noticeable difference (JND) of mechanical properties. JND means the smallest difference in a property which a person can detect. To further explore this idea, we are designing a perceptual experiment that could be used to understand how JND is affected by higher frequencies that are excited even in motions that move through contact transitions, even when moving at a single frequency. A contact transition occurs when a user moves from a freespace setting into a virtual wall, which is modeled as a stiffness. By testing perception of stiffness with and without contact transitions, we can see how higher frequencies excited by contact transitions affect JND. This was achieved by having participants perform a perceptual experiment while tracking a sinusoid with a single-axis haptic device. Participants were asked to match an adjustable spring to a given reference stiffness using an adjustment control in conditions with and without contact transitions while tracking the sinusoid. We expect that as higher frequencies are excited by contract transitions, the JND will also increase proportionally making it more difficult to determine at which point we can tell a difference.

Phase Behavior and Reactivity of α -Keto Acids at Air-Water Interfaces

Jess Rugeley*, **Claire Koltun***, Rebecca Rapf

Organic surfactants are found at air-water interfaces in natural environments, including on the surface of aqueous aerosols, such as those generated from sea spray. Depending on the solubility and surface activity of the organic species, they can either partition to the sea surface microlayer (SML) or remain in the bulk phase. Here, we examine the structure and morphology of organic monolayers at the air-water interfaces. Using a Langmuir trough and infrared reflection absorption spectroscopy (IR-RAS) to explore phase behavior and key structures, we first focus on a library of α -keto acids that are insoluble surfactants composed of 18-20 carbon tail length. With a range of surface activities, we explore how the phase behavior changes for these carboxylic acid derivatives, including isotherm compressions, hysteresis, and relaxation experiments. The ionization properties of organic acids are also known to change at the interface compared to the bulk, and, here, we will report on our measurements of both the bulk and surface pK_as of various alkyl acids, including octanoic, nonanoic, 2-oxooctanoic, and 2-oxovaleric acids.

Funding Sources: Dreyfus Foundation, Cameron Foundation.

Investigating the Reduction Potential of the Rieske protein in *Spinacia oleracea*

Devin Saenger, Laura Hunsicker-Wang

The Rieske protein is of interest due to its unique properties. Located in the mitochondria, the metalloprotein is indispensable for many metabolic functions, helping drive the electrochemical gradient necessary for ATP synthesis. The characteristic property of the Rieske protein is the [2Fe-2S] cluster bound by two histidine and two cysteine residues. This cluster has an associated reduction potential, the ability to accept an electron, which allows the protein to perform an oxidation of quinol in its function in the Electron Transport Chain. The Hunsicker-Wang lab is interested probing and characterizing the structure which modulates reduction potential. The lab has performed research on the Rieske proteins in a bacterial system, *Thermus thermophilus*, and a eukaryotic system, *Saccharomyces cerevisiae*, but has not yet probed Rieske in photosynthetic systems. The current project investigates the structure and function relationships in *Spinacia oleracea*, spinach, which will allow for characterization of a photosynthetic Rieske. In tandem, these studies will allow a better understanding of eukaryotic and bacterial systems through comparison.

The current goal of the project is to purify and characterize wild-type spinach Rieske. The purification involves the adaptation of numerous protocols to achieve a purification, which utilizes several new techniques to ensure the extraction of pure protein. The characterization of wild-type spinach will use two techniques: pH-dependent CD spectroscopy and DEPC modification. Each technique probes the reactivity of the histidines which ligate the [2Fe-2S] cluster in wild-type spinach.

Funding Source: Trinity University Chemistry Department, Beckman Foundation

A cross-cultural examination of story formats and their elements as drivers of engagement in consumer contexts.

Gabriela Jodas Salgado*, Mario Gonzalez-Fuentes

A popular Native American proverb says “Tell me a fact and I’ll learn. Tell me a truth and I’ll believe. But tell me a story and it will live in my heart forever.” The literature studying narratives as a form of communication agrees that stories are highly persuasive devices to deliver messages and ideas. They are even more effective than other forms, like traditional advertising, or fact-based communications. The current project aims at answering the following questions: What story formats are more persuasive in engaging audiences and leading them to take action? Are there certain elements of a story that contribute more than others to engage and persuade? Our project consists of two experiments conducted through online surveys in Qualtrics, with data collection done through a crowdsourcing platform (e.g., MTurk). These experiments use variations of popular video advertisements as stimuli. Study 1 explores the impact of tension in a narrative as well as the sense of control of the narrative flow (through a choose-your-own-adventure strategy) on engagement and persuasion. In Study 2, we aim at exploring the impact that knowing a story’s protagonist’s inner thoughts can have on the audience’s engagement with the story and its influence on taking actions.

The Way Things Change: A Look at the Museum Industry Through Archives from the Last 30 Years

Claire Sammons*, Kate Ritson

This summer I had the opportunity through Trinity University's Arts Letters and Enterprise program to be the curatorial intern at the San Antonio Museum of Art (SAMA), a non-profit art museum in San Antonio dedicated to collecting, preserving, and sharing beautiful works of art throughout history and the contemporary, from the San Antonio community and beyond. I have had the privilege to work under Lucia Abramovich Sanchez, the Associate Curator of Latin American Art, and Lana Meador, the Associate Curator of Contemporary Art.

Alongside Lucia I worked on archiving the files of Marion Oettinger, curator emeritus of Latin American Art and former Director of the SAMA. This gave me a unique perspective on the history of the museum through the eyes of someone with over 30 years of museum experience. I was also able to work directly with new acquisitions into the collection to gain a better understanding of the modern process of documenting acquisitions. With Lana I had the privilege to go into the museum storage areas and aid in the selection of pieces that reside within the permanent collection for future exhibitions. These experiences with Lucia and Lana, alongside working with the materials I archived, allowed me to see the changes that occurred at SAMA throughout its history as the museum grew and the industry changed.

Now with both a modern, and historical vantage, I can view the museum industry with a new, more expansive perspective, that I did not have before, which will aid in my future career interests within the museum industry and archaeology.

Funding Source: Arts, Letters, and Enterprise Program

The Toxic Duo of Tau and Amylin and Their Role on Type 2 Diabetes and Alzheimer's Disease

Natalia Santos*, Luthary Segura Kwan H. Cheng

Epidemiological studies show that individuals with type 2 diabetes (T2D) have a 73% chance of having dementia, and a 56% chance of having Alzheimer's Disease (AD). Research suggests that misfolded tau protein and human islet amyloid polypeptide (amylin) may aggregate in T2D and AD brains. Amylin, which is co-secreted with insulin by the pancreas, tends to self-aggregate, and damage insulin producing beta cells. The self-aggregated form of amylin may also penetrate the blood brain barrier and damage neuronal cells. Misfolded tau protein may come into contact with self-aggregated amylin and their cross-interaction may lead to increased neurotoxicity. To our knowledge, no previous research has focused on the cross-interactive effect of heterogeneous tau-amylin oligomers. In this study, we used coarse-grained (CG) dynamic simulations of three neuronal membranes. The three neuronal membranes are different regarding the lipid nanodomains they contain. We designed a control (CO) lipid raft, a phosphatidylserine (PS) raft, essential in protecting the interior of brain cells, and a ganglioside (GM) raft, known to promote amylin binding on membrane surfaces. We investigated the folding of tau and amylin oligomers with the algorithm Dictionary of Secondary Structures of Proteins (DSSP). Results from a Multivariate Analysis of Variance (MANOVA) on the comparison between homogenous tau oligomers and heterogenous tau-amylin oligomers, showed a significant difference in secondary structure alpha helices. However, there was not a significant difference in beta sheet formation. This may suggest an important role of alpha helices in contributing to the misfolding of heterogeneous oligomers. Our research may guide clinical studies in investigating the metabolic components of AD and the neurodegenerative aspects of T2D, as well as designing pharmaceutical treatments capable of targeting oligomeric forms of tau and amylin.

Summer Internship at Kalos Strategies How being a Complex Student helps Solve Complex Problems

Heath Schake*, Ruben Dupertuis

This summer I had the opportunity to work at Kalos Strategies as a summer intern. Kalos Strategies is a consulting agency that specializes in helping non-profit organizations in a multitude of different fashions. I primarily focused on assisting the Kalos team through research, reviewing documents, and meeting with clients. During my time there we did everything from designing websites to helping structure entirely new organizations.

As a student who is currently working on my BCMB and Religion degrees, I feel that my diverse skill sets were utilized while interning at Kalos. One of my primary projects was conducting research for our partner organization Redfern Analytics. Redfern Analytics is a company that creates economic models that help contextualize different challenges our country faces and helps offer pragmatic policy solutions. My STEM background was of particular use in this project as being scientifically literate helped me conduct research related to eliminating Hepatitis C in the U.S., lawmaking surrounding small and large molecule drugs, and limiting the impact of the mental health epidemic. With the information I gathered, Redfern will be able to develop multiple economic models that can be utilized in the development of better policy that is economically sound and actually solves these problems.

My time at Kalos Strategies taught me that my varied background can be used in a multitude of different ways to help improve social justice in this country. Being able to understand the causes of many of these crises today can better help in the implementation of better policies that help a larger amount of people while spending less money. This internship also exposed me to new ways of thinking, including integrating the economic modeling into the solutions required to make this country better for all.

Funding Source: Stinner Fellowship

Visualizing Holocaust Testimony

Kate Schulle*, Victoria Aarons

With the end of direct survivor testimony, the transmission of Holocaust memory by subsequent generations of Holocaust writers and the need to confront the Holocaust – and the ways the Holocaust has shaped the contemporary global landscape – are more urgent than ever. While the Shoah may seem like history, there has been a shocking rise in antisemitism and racially and ethnically motivated intolerance since the end of World War II. Thus, this project has important implications for the study of contemporary expressions of intolerance and prejudice.

Recent Holocaust testimony has expanded to include the hybrid genre of Holocaust graphic novels and memoirs. A recently published collection of graphic stories, *But I Live*, is an innovative approach to Holocaust representation – facilitating a polyphonic dialogue among scholars, survivors, and graphic artists. *But I Live*, edited by Canadian Holocaust scholar Charlotte Schallié, consists of three chapters narrated by four adult child survivors and illustrated by three comics artists. The book concludes with scholarly historical accounts of the role of Nazism in rupturing the lives of these narrating survivors. Our project reflects on the ways in which Holocaust testimony is negotiated through these multi-generational, overlapping voices and perspectives. *But I Live* moves from individualized experiences of survivors to a historical account of the collective mass destruction of lives and communities. Specifically, we examine the impact of the survivor-witness relationship on representing Holocaust testimony in the third chapter of the volume, titled “But I Live,” and its unique approach to the transmission of traumatic memory. We examine further the ways in which comics artists, in reinscribing survivors’ narratives, create a visual testimony to memory by recreating the material landscape of trauma. Together, these voices raise important questions about forms of testimony and witnessing as well as the future of Holocaust representation in K-12 educational curricula.

Non-Stratiform Dolomitization on the Margins of the Great Bank of Guizhou, South China

Madison Sears*, Daniel Lehrmann

The focus of this project is on the dolomite fronts along the Lower Triassic margins of the Great Bank of Guizhou. The Great Bank of Guizhou, which is located in the Nanpanjiang Basin, is a large isolated Triassic carbonate platform in southern China. The contacts between limestone and dolomitized material here are cross-cutting original bedding and form irregular shapes on the outcrop. The dolomitization occurred later than the deposition, or else it would have been stratiform in nature. Fine to medium grained light gray crystalline dolomitic rock replaces lime grainstones and packstones in these areas. Ooid grainstone and burrows are also present, some being dolomitized and some not.

Previous data from this area using fluid inclusion and clumped isotope geothermometry indicates that dolomitization occurred with high temperatures at burial, within a spatially variable range of 90°C to 185°C. $^{87}\text{Sr}/^{86}\text{Sr}$ data indicates values of 0.707677 to 0.708601, which suggests and is similar to the ratios found in Triassic seawater. This is consistent with the hypothesis of evaporative reflux dolomitization. $\delta^{18}\text{O}$ (VPDB) values for dolomite range from -7.68‰ to -1.53‰, consistent with evaporative enrichment of seawater and high burial temperatures.

Samples were taken extensively across each outcrop at each possible contact between dolomite and limestone as well as from completely dolomitized areas and limestone with minimal dolomitization. Later work on this project will use these samples and will include mapping, fluid inclusion data, and stable isotope data to get specific results for the dolomite front outcrops to determine the constraining factors of the discordant dolomitization, why it occurs, and whether or not it is consistent with a reflux dolomitization hypothesis.

Funding Source: National Science Foundation

Exploring Environmental Stewardship: San Antonio River Foundation

Max Sebbar*, Jennifer Rames

This summer I was afforded the opportunity to do a ten week internship program with the San Antonio River Foundation, the nonprofit arm of the San Antonio River Authority, dedicated to cultivating the human connection to the river. They steward the river through public art installations, community programming and outreach, and their award-winning Confluence Park. My internship encompassed a wide range of projects, offering a comprehensive understanding of the inner workings of an environmental nonprofit organization.

A significant part of my internship was focused on marketing and community planning, which provided an opportunity to enhance graphic design and social media skills. While creating community events that were both desired and beneficial for San Antonio, I gained practical experience in engaging with the local community and understanding their needs. Additionally, I found the nonprofit management and development side of this internship the most intriguing. I learned how to use Bloomerang, a donor management software. I learned how to attract more donors and prepare for large-scale donor campaigns, deepening my understanding of fundraising strategies.

Working alongside the exceptional staff at the San Antonio River Foundation not only enhanced my office environment skills but also provided valuable insights into the type of work environment I aspire to be a part of in the future. Through this internship, I gained a greater understanding of my strengths and skills and how they align with the nonprofit sector. Overall, the internship at the San Antonio River Foundation offered a holistic understanding of the nonprofit sector, with a specific focus on environmental stewardship. Through hands-on projects, I developed practical skills in marketing, community engagement, and donor management. The experience also instilled a deep appreciation for the importance of preserving the San Antonio River and fostering a strong connection between the community and the natural environment.

Funding Source: Arts, Letters, and Enterprise Program

Optimizing Drug Development Modeling Using Scientific Machine Learning Targeting Protein Aggregation in Alzheimer's and Diabetes

Luthary Segura*, Natalia Santos, Rafael Flores, Donald Sikazwe, Kwan H. Cheng

Misfolded, ordered, self-aggregated Tau and Amylin fibrils in the pathogenesis of Alzheimer's and Diabetes have been widely considered as histopathological hallmarks of these diseases respectively. However, recent studies suggest that the complexes formed prior to fibrils, aggregates (oligomers), are the main neurotoxic species. Using coarse-grained and all-atom computer-modeling, we create and investigate membrane-bound oligomer structures of Tau, Amylin, and Tau-Amylin. This study focuses on docking these oligomers with multiple anti-aggregating, anti-oxidative, and enzyme-specific ligands, specifically EGCG, CNS-11, BHT, BHT analogs, and a native ligand to GSK-3 β . Recent studies have discovered that EGCG and BHT-analog exhibit anti-tau phosphorylation via suppression of the enzyme GSK-3 β and anti-oxidative properties on fibril structures. In addition, EGCG has been shown to improve anti-aggregation. Unfortunately, EGCG is known to have low bioavailability. For this reason, molecular modifications to the EGCG compound and dock testing is important for finding a similar compound with improved bioavailability. CNS-11, a similar compound to EGCG, exhibits anti-super aggregating properties. However, there is no evidence showing antioxidant or enzyme-specific properties. Through the utilization of AI optimized drug scoring, our results reveal that EGCG and CNS-11 have the highest affinity to the oligomers for all three aggregate groups as well as to their fibril structures confirming previous research results. Due to the lack of anti-oxidative properties in CNS-11 and bioavailability of EGCG, it is important to consider further research in a compound with these additional features. Additionally, our results show some discrepancies between the top ligands defined by Autodock Vina and the top ligands defined by the AI ligand re-scoring software which demonstrates the importance of further docking optimization.

Funding Source: Welch Foundation

Classification of Plant Exudates via Principal-Component and Cluster Analysis of ^1H NMR Variables

Dana Sheehan*, Joseph Lambert

When exposed to high levels of stress or external damage, many plants will produce a sticky organic material known as an exudate. While over 14 molecularly distinct classes of exudates have been identified, the resins, consisting of polymerized terpenoid organic compounds, proved to have diverse characteristics within their classification. Previously, the spectra were distinguished entirely on the basis of visual comparison of spectra, which is limited in its ability to distinguish spectra when compared with more analytical methods. Through visual analysis of their spectra, normalized intensity data were recorded at 73 select chemical shifts. The data then were analyzed via principal-component and cluster analyses in SPSS, in order to classify these materials on the basis of molecular structure. When applied to a pilot group of 78 resins from 28 distinct taxonomic families, this method was successful in separating angiosperm and gymnosperm resins based on correlations in their spectra. Furthermore, certain gymnosperm resins were determined to be molecularly distinct based on their taxonomic order. Currently, we are focusing on the similarities between taxonomic groups. However, with over 700 resin spectra in our collection, in the future we hope to expand the classification system to compare spectra across different geographical locations and evolutionary background, based entirely on molecular structure.

Funding Source: Welch Foundation, Jean Dreyfus Lectureship Grant

Consulting Beyond the Company: The Process of Launching a Charter School

Sophie Shields*, Tim O'Sullivan

This summer, I interned at Kalos Strategies, a consulting company that launched this past January in San Antonio. Kalos Strategies helps various clients (including nonprofits, grantmakers, and policymakers) to address needs in their communities. During my internship, I worked with one specific client focused on launching several charter schools in Texas in the next two years. Before participating in this internship, I only had a vague idea of how consulting companies operated, and didn't appreciate the variety of clientele they worked with. I pursued this internship because I hoped to become better acquainted with the processes involved in consulting. Now, I believe I am equipped with a much better understanding of these processes, and believe that I will be able to use this knowledge to my advantage when I enter the workforce and communicate with both future employers and colleagues.

I completed various assignments during my internship, but most were focused on one particular client: a nonprofit organization called Bellwether, whose goal is to open twenty-five new charter schools across Texas by 2025. Some of my specific assignments involved designing and providing feedback on flyers, social media accounts, and websites to best represent several of these new schools. In addition, I also spent time researching ways in which the language used in the marketing of these schools needed to be altered in order to seek approval from the Texas Board of Education. My research extended to charter schools in and outside of Texas that had already found success in previous years, and common threads in their models that could be applied to the schools supported by Bellwether.

These assignments taught me much about how Kalos Strategies operates as a company and gave me insight into consulting companies as a whole. I became more confident in my ability to make decisions without needing input from others, and I definitely think my ability to communicate with both colleagues and clients in a business setting has improved. This internship has allowed me a space to grow in all of these areas, and I am immensely thankful for the opportunity.

Funding Source: Classical Studies Department

Synthesis of Fluorogenic Monomer Probes for Radical Polymerization

Maggie Karim*, Nathan Siciliano*, Christina B. Cooley

Fluorogenic monomer probes reveal their fluorescence upon radical polymerization, allowing for the detection and amplification of an initiator signal, and providing a readout for the kinetics of a polymerization reaction in real-time as the monomers are incorporated into the growing polymer chain. However, our original probe, anthracene methacrylamide, has a major drawback that limits its future applications, namely, the requirement of added surfactant for its polymerization in aqueous media. This surfactant requirement limits the maximum fluorescence of our synthesized polymers, providing a barrier to applications of this fluorogenic polymerization technology. To overcome these challenges, we sought to design and synthesize an intrinsically water-soluble fluorogenic monomer probe by addition of an ionizable sulfonate group. Direct sulfonation of the polycyclic aromatic monomer probe is not feasible, as the methacrylamide group is unstable to the strongly acidic conditions utilized in classic aromatic sulfonation chemistry. To bypass this issue, a strategy applying sulfur (VI) fluoride exchange (SuFEx) chemistry is being developed to conceal water solubility in the precursor through installation of a fluorosulfate tag. Following monomer construction, the charged sulfonate will be revealed at the desired site, thereby increasing the solubility of the monomer in aqueous media. Progress towards the synthesis of this water-soluble, fluorogenic anthracene monomer probe as well as other fluorogenic probes under investigation will be discussed.

Funding Source: Welch Foundation, National Science Foundation.

Cultivating Ourselves Through Nature: a San Antonio Botanical Garden Internship

Anthony Sierra*, Jennifer L. Rames

This summer, I had the fantastic opportunity to intern at the San Antonio Botanical Garden, working closely with the education team and various other departments within this non-profit organization. As an intern within the education department, I attended and ran multiple events to educate people on the importance of conserving the surrounding environment. I also took part in the team working on the interpretation and signage of the garden's newest attraction 'WaterSaver Community' which seeks to educate guests on the importance of sustainable conservation while inspiring homeowners to conserve water by moving away from traditional grass lawns.

Working with every part of the garden, I experienced how this unique non-profit functions. Employees, staff, and volunteers each play critical roles in the gardens' upkeep and everyday operations. The garden has over 300 volunteers who are the essential backbone to keeping the garden alive. I was given the opportunity to work with numerous volunteers to accomplish many tasks including planting and propagating plants that were grown in the on-site greenhouses. Many of the volunteers are master gardeners or naturalists with decades of experience to pass on to me. Throughout my short time with them, I expanded my horticultural knowledge and gained new experience caring for a garden of this size, approximately 38 acres.

During my short time here, I learned a lot and expanded on the goals I created before beginning this internship. Every day was something new, consistently meeting and interacting with new people, constantly helping me to grow out of my comfort zone. Throughout this internship, I developed skills in interpretation, leadership, and plant care that will help me throughout my post-graduation plans.

Funding Source: Arts, Letters, and Enterprise Program

Investigation of Altered Cellular Localization of Disease Related Mutants of Fig4

Anirudan Sivaprakash*, Bethany Strunk

Fig4 is a phosphoinositide phosphatase that converts its substrate PI3,5P2 to PI3P for cell signaling purposes. Paradoxically, Fig4 is also responsible for the production of PI3,5P2. Fig4 performs this action via its association to its opposing kinase Fab1 and the scaffolding protein Vac14. Mutations in human Fig4 are linked to neurodegenerative diseases including CMT, ALS, and leukodystrophy. These conditions are generally attributed to dysregulation of PI3,5P2. When these disease mutations are exposed to the specific stress condition of 37°C and rapamycin (an inhibitor of TORC1, a metabolic switch), a growth advantage is conferred. We posit that when Fig4 is dissociated from the Fab1-Vac14 complex it associates with other proteins/pathways in a context inappropriate manner to confer a growth advantage under these conditions. We have been utilizing fluorescent microscopy to determine whether fluorescent protein-tagged Fig4 disease-related mutants display altered localization compared to wildtype cells under standard conditions or following rapamycin treatment at 37°C. In wildtype cells, under standard conditions, Fig4 is localized to the outer vacuole membrane. Under the same conditions we have determined that disease-related mutants of Fig4 that cause the growth advantage are diffuse in the cytoplasm. We are in the process of determining the localization of wild-type and mutant Fig4 constructs at 37°C in the presence of rapamycin. We are also investigating the localization and relative amounts of candidates for proteins that are mediating the mutant Fig4-dependent growth advantage on rapamycin at 37°C. We suspect that Fig4 may alter the behavior and perhaps localization of other proteins in the cell to confer the observed growth advantage. Ultimately we will look for colocalization of Fig4 and other proteins involved in the growth advantage to better understand the mechanism by which these proteins work together to confer this phenotype.

New Applications for Open-Air Photoinitiated Fluorogenic Polymerization

Azarya Solomon*, **Maggie Karim***, Christina Cooley

The Cooley Lab developed a detection assay using fluorogenic polymerization, allowing for simple, real-time monitoring of signal amplification. This method couples the polymerization initiation event to the presence of a desired analyte so that the formation of a visible, fluorescent polymer signals analyte presence. Although promising, sensitivity to oxygen and long reaction times limit the original method's translation to biodetection applications, prompting the development of alternative fluorogenic polymerization reaction platforms. Therefore, a controlled photoinitiated reversible addition fragmentation chain-transfer (RAFT) polymerization was developed and optimized with an enzymatic degassing approach, enabling the reaction to occur in an open-air vessel without oxygen interference. Additionally, an uncontrolled photoinitiated polymerization technique was utilized to decrease the time required for signal detection. This method further applied the same enzymatic degassing technique used in the RAFT polymerization and both methods are able to be run on a miniaturized scale to increase throughput.

The ability to run these polymerizations in open-air environments on 96 well plates has allowed the Cooley Lab to explore new detection applications, including protein detection as well as monitoring polymerization kinetics by fluorescence. Protein detection is being explored by the synthesis of an Eosin Y - biotin conjugate for the detection of streptavidin. We are also utilizing fluorogenic polymerization to monitor monomer kinetics using two types of fluorogenic monomers, anthracene methacrylamide (AnMA) and acridine methacrylamide (AcMA). Through the use of trace amounts of fluorogenic monomer coupled with a co-monomer (PEG), the Cooley Lab has developed a non-invasive method of monitoring the degree of polymerization (DP) and polymer weight through the utilization of fluorescence. By incorporating AnMA and AcMA along with PEG, we are working to create an established relationship between observed fluorescence and the degree of polymerization.

Funding Sources: Welch Foundation, National Science Foundation

Carving out History: My Time at the Carver Center

Hillary Solomon*, Jacob K. Tingle

This summer, I was overjoyed to intern at the Carver Community Cultural Center, sometimes shortened to the Carver. The Carver serves as a multifunctional space for San Antonio's Eastside. It was the only auditorium Black people could go to during segregation. Now, the Carver hosts musical and theatrical events, dance performances, and educational programs. This ALE internship taught me more about San Antonio's history, the Carver's history, and the intricacies of a city-run organization. My time at the Carver gave me a deeper appreciation for archival work and a strong desire to learn more about Black history.

As the marketing intern of the Carver, I was tasked with creating a virtual historical tour of the facilities. As such, I had to compile, research, and synthesize information about the Carver. I worked closely with my supervisor, Ernie Ramirez, and the house manager, Ashley Clinton, to create this project. The beauty of my job was the creative freedom I had. The virtual tour was completely mine to mold and shape however I wished. I wrote the scripts, directed and edited the videos, and conducted interviews. This project helped enhance my communication and video editing skills. I am grateful to have created something that showcases the beauty and importance of the Carver. I could not have done it without the encouragement and help from my coworkers, some of whom have been at the Carver since the mid-'90s. I now know that the Carver is an important part of Black history and San Antonio's history, but sadly the site has not always been a funding priority for the city. So, I have decided to petition the city of San Antonio to fund this historic site properly. I plan to continue advocating for and promoting the Carver long after the internship ends.

Tech and Beyond: A Peek into Life at The Public Theater

Gabriella Stein*, Stacey Connelly

Through Trinity's ALE program, I was given the opportunity to intern at, the Public Theater of San Antonio founded in 1912. Their mission is to create theatre that unites the diverse communities of San Antonio. The appeal of interning at The Public as opposed to another theater is the wide variety of departments I have been able to assist in, as opposed to only contributing to the theater's marketing campaign. I assisted with costume construction, marketing, and even took charge of sourcing the props for the theater's upcoming production of the musical *Merrily We Roll Along*.

The variety of tasks I completed during my time at The Public Theatre of San Antonio taught me the importance of all aspects of the theater; a theater cannot stand on its feet without all the departments playing their prospective roles. The roles that stood out most to me personally were the technical ones. By working with various people while being in charge of props, I have increased my communication skills. Not only has this task assisted me in communication but by pairing my work deducing how some props will eventually need to be built with other tasks like constructing costumes: I have increased my knowledge of the technical side of theatre as a whole. My internship with The Public Theatre has opened my eyes to the workings of a nonprofit theater and provided me with an understanding of what this potential career path would mean being able to collaborate with fellow creatives as a team.

Using Notch/Delta from a Nematode to Label Contacting Cells

Gary Sun*, Alice Dang, Amanda Flanagan, Manisha Saraswathi, John Clark, Madison Horn, Evan Farrell, Julian Valadez, Cole Williams, Gerard M. J. Beaudoin, III

In the newly emerging field of neuroscience, tools are needed to selectively label synapses with hopes of eventually building a synaptic map of the brain. This comprehensive map holds the potential to address long-standing inquiries posed by neurologists and psychologists, unlocking crucial insights into the physical manifestations of disorders and addiction in the brain. Considering that current methods for labeling synaptically connected neurons are either cytotoxic or inefficient at producing a signal, we are designing a new transsynaptic labeling system. We hypothesized that the Notch-Delta signaling system homologues found in *C. elegans* Glp1 (Notch) and Lag2 (Delta) could be used to genetically label cells contacting each other. Cre-recombinase, a site directed DNA recombination enzyme, has been cloned onto Glp1 so that whenever the Glp1 receptor on one cell meets the ligand, Lag2, on another cell, the release of cre recombinase to the nucleus results in the selective expression of a fluorescent molecule. *In vitro* testing using cultured cells indicates that the labeling mechanism performs as expected in which Glp1 and Lag2 selectively label cells based on contact. Future work will determine if this system works across other cellular contacts, like a synapse, using cultured neurons and neurons *in vivo*.

Funding Sources: Biology Summer Undergraduate Research Fellowship, Voelcker Foundation, Trinity University Start-Up Funds, Brain and Behavior Research Foundation, Groff Foundation, Trinity University Women in STEM Program

***Pseudomonas aeruginosa* Motility Near Surfaces**

**Hannah Supranowicz*, Victoria Torres, Omaree Kimbrough, Orrin Shindell, Hoa Nguyen,
Frank Healy**

Singly flagellated bacteria are able to move through liquid by operating their flagellar motors, generating torque on their helical filament. One species of bacteria that operates as such is *Pseudomonas aeruginosa*. The motor's general structure is shared amongst different species. Due to the structure conservation, it's been hypothesized that the motor achieved its optimal configuration. In *P. aeruginosa*, we observe two distinct stator units in the motor: MotAB, generates a larger torque, and MotCD, which creates a stable motor speed. To discern the relationship between the structure of the motor and its efficiency, chimeric stator units can be achieved using these two variations. While the chimeric stator units are substandard, they still function properly. Thus, in the strains of *P. aeruginosa* expressing the chimeric stator unit, we can observe the amino acid substitutions that transpire through each generation of directed microevolution as the stator unit reaches its most productive structure.

We began by focusing on the development of methods to measure bacterial motility. We imaged the bacteria using total internal reflection fluorescence microscopy. After processing the images, we import them into a custom MATLAB script which works to track and model the bacteria. We have then been working on implementing a three-dimensional modeling algorithm to reconstruct our bacterial images. In parallel, we have been functionalizing a procedure for creating supported lipid-bilayers (SLBs) whose surface properties can be adjusted to simulate a mucosal membrane. Future work aims to extract the motility measurements over the SLBs so we can input them into a computational fluid dynamics model. Using this model, we will calculate the motor's metabolic energy cost and determine the protein residues responsible for this energetic efficiency.

Stem Cell Adherence: Improving Process of iPSCs' Attachment Used for Stem Cell Therapy

Peyton Tabor*, James R. Shinkle, Alia Mallah

During my internship at GenCure, a company that manufactures products for stem cell therapies, I worked on cell culture and aseptic techniques. Stem cell therapeutics are an emerging field that uses stem cell products produced for healing applications such as wound healing. Induced pluripotent stem cells (iPSCs) are good candidates for these therapies because they can differentiate into any cell type in the body. In this application, the iPSCs were differentiated towards retinal precursor cells used in clinical trials for ocular diseases.

iPSCs need a substrate, a surface that cells attach to, to grow. To enhance this attachment, various substrates can be tested. The experimental control used a coating of vitronectin, a protein that promotes cell adhesion and spreading, to work as the substrate. Vitronectin is believed to wear off after ten days, so the cells need to be passaged, which is the transfer of cells from a previous culture vessel into a freshly-coated vessel. However, the cells might not be ready to be passaged, which affects the duration of the experiment and differentiation protocol. The purpose of this study is to find an alternative substrate that enhances iPSCs' attachment, improving efficiency and reducing process time. Tissue culture plastic (TCP) and CellBind, readily-available manufactured substrates, were tested as alternative substrates for iPSCs.

To test this, three groups of three T-25 flasks were seeded — the “T” refers to the total surface area available for cell growth in cm^2 . The control group of flasks had vitronectin coating. For both experiment groups, one group used CellBind and the other used TCP. All groups were seeded at a density of 10k cells/cm^2 . Microscopy and plating efficiency — the number of harvested cells divided by the number of seeded cells, multiplied by one hundred percent — were used to test the efficiency of each substrate.

The Tuesday Musical Club: Empowering Women Through Music Since 1901

Corrinne Tallman*, Carl Leafstedt

The Women's Club Movement of the early 20th century was responsible for cultural enrichment all over the US. Music clubs educated their communities by inviting talented guest artists to their small towns, providing lessons and scholarships to young musicians, and hosting public concerts so everyone, no matter their economic status or race, could have access to music. Women who were passionate about the arts finally had the opportunity to gather and share their interests, and by doing so found they were far stronger together than separated in their own homes. They began to enter the public sphere, one small step at a time, showing together they could accomplish great things. Music, in the hands of its all-female membership, became an important vehicle for civic and personal empowerment.

San Antonio's Tuesday Musical Club is a shining example of an organization established during the Women's Club Movement, and has remained a stalwart institution ever since its founding in 1901. Born from the mind of Mrs. Anna Goodman Hertzberg (1864-1937), the Tuesday Musical Club has shared its love of music with our community for over a century. Thanks to her vision, charisma, and organizational skills, the women of the Tuesday Musical Club saw that they too could make a difference.

There are many stories to be found in such an established organization, so our goal this summer was to unearth the early days of the Tuesday Musical Club. Dr. Carl Leafstedt and I have combed through the club's archives located in the UTSA Special Collections and the San Antonio newspaper database to bring life to some of these forgotten stories. At the same time, we have been investigating the Women's Club Movement as a whole in order to better contextualize our findings, and provide a more holistic understanding of the time period.

Indigenous Historical Preservation at AITSCM

Cal Taylor*, Lauren Turek

As part of the ALE internship program, I am an Intern for the American Indians of Texas at San Antonio Colonial Missions (AIT-SCM or AIT). Within the organization, I follow the direction of Rudy De La Cruz Jr., director of AIT-SCM's Texas Heritage Project (THP).

There are several ongoing projects that have been ongoing during my tenure at AIT-SCM. For example, most work days include the scanning and cataloging of photos from AIT's "History Harvests". During a History Harvest, AIT collects historical photographs and other primary sources from members of San Antonio's indigenous communities. We then process these materials at the office, before returning them to their original owners. Another common occurrence at the THP office are interviews with local Indigenous leaders. We compile notable quotes and perspectives from these interviews and use them in Indigenous history exhibits.

I have worked on several special projects for the department. In May I developed an exhibit about Indigenous Military Service. I have also spearheaded interviews with local Indigenous historians to develop an exhibit about Indigenous labor in San Antonio. Finally, I am developing a wikipedia page for AIT-SCM, to provide accurate information about the organization.

Trouble Brewing: Adolphus Busch's Legal and Political Battles

Sarah Theuret*, Todd Barnett

Adolphus Busch, the cofounder of the Anheuser-Busch Brewing Association, was an important and controversial political and economic actor throughout the Gilded Age and Progressive Era. Busch was a central organizer and political lobbyist for the anti temperance movement, and was consequently vilified by powerful temperance advocates. Temperance organizations at this time were often viewed as “moral” and “legal,” while the liquor interest’s actions were labeled “immoral” and “criminal.” Our project challenges this narrative. We argue that brewing companies and temperance organizations, specifically the Anti-Saloon League, used similar tactics to achieve their prospective goals.

This project involves combing through temperance organization archival sources, such as checks, correspondence, and meeting notes from Ohio and Texas, as well as legal sources found in Google Scholar case law, records of the Supreme Court, primary newspaper accounts, and Lexis. The legal research serves to show the dull everyday issues of the Anheuser Busch Brewing Association such as debt recovery and negligence suits, as opposed to ASL lawyers using the courts to shut down saloons. While Anheuser-Busch was attacked for using court cases to challenge prohibition, our research shows that temperance organizations used the same legal and governmental structures as the liquor interest to achieve their goals.

Our research also shows that the Anti-Saloon League specifically engages in morally questionable actions. They use “expenses” reimbursement to overpay employees and politicians and have a comprehensive lobbying network forming relationships with and writing legislation for congressmen—the same tactics for which they accused and condemned Anheuser-Busch. While temperance organizations claimed the moral high ground in their fight against the liquor interest, our research shows that behind the scenes they operated much like the brewers they vilified.

Bacterial Motor Mechanics

Victoria Torres*, Orrin Shindell, Frank Healy, Hoa Nguyen

Many motile bacteria, including *Pseudomonas aeruginosa*, achieve motility by using their flagellar motor to generate a torque that rotates a helical filament and propels their body forward. The structure of this motor is highly conserved across species, making it a target for understanding the relationship between its structure and energetic efficiency. This high degree of conservation implies that the motor has reached its optimal structure but the protein residues responsible for this energetic efficiency remain unknown. To solve the relationship between motor structure and energetic efficiency, we will create a chimeric motor with the two stator unit variations observed in *P. aeruginosa*: MotAB which generates a higher torque and MotCD which generates a stable motor speed. While still functional, the chimeric stator unit would be suboptimal. By performing microevolutionary assays in *P. aeruginosa* strains expressing this chimeric stator unit, we can track the amino acid substitutions that occur in each generation as the stator unit reaches its most efficient structure.

We have developed an automated tracking and positioning algorithm for motile bacteria imaged near a surface. The algorithm takes a video of bacteria imaged under total internal reflection fluorescence microscopy and efficiently reconstructs their trajectories. Intensity profiles of the bacteria are saved at each point in their trajectories and used to extract each bacterium's spatial orientation. We are optimizing a three-dimensional reconstruction algorithm that inputs these intensity profiles and returns the dimensions of the bacterium. This algorithm has already been implemented to study the motility of *Escherichia coli* near surfaces and preliminary results confirm its accuracy. Future experiments will focus on implementing this algorithm to study *P. aeruginosa* motility near surfaces and flagellar motor mechanics.

Hope and Healing: Experiences from the Children's Bereavement Center of South Texas

Andrew Tyler*, Jacob K. Tingle

This summer, I worked at the Children's Bereavement Center of South Texas as a development intern through Trinity's Arts, Letters, & Enterprises program. The Children's Bereavement Center of South Texas is a non-profit organization that serves individuals ages 3-24 suffering from the loss of a loved one. They provide services including individual counseling, support groups, and grief camps. I spent most of my internship with the development department, which mainly oversees fundraising and donor outreach. I also participated in evening support groups once a week. My time at the center enabled me to develop my professional skills and gave me experience in grief counseling, which I hope to do in my future career.

Some of my responsibilities as a marketing and development intern included: inputting volunteer information into the organization's database, initiating background checks on prospective volunteers, coordinating gifts for donors, and leading tours of the center for incoming families. I also helped prepare two monthly newsletters and create social media marketing materials and became more competent in programs such as Excel and Canva. In addition to my internship duties, I assisted with support groups once a week. Each Tuesday evening I led two young children through grief processing activities. These evenings were by far my favorite times at the center. It was incredibly rewarding to help the kids process their grief and express their feelings.

My internship gave me valuable insights into the nonprofit industry. I witnessed firsthand how the Children's Bereavement Center reaches donors, advertises to other organizations (e.g. school districts, hospitals), and organizes high-level projects. Working with the center also enabled me to improve both my communication skills and my confidence in a professional environment. In addition to learning about the nonprofit world, I gained experience in grief counseling, which I am very grateful for.

Funding Source: Arts, Letters, and Enterprise Program

Tracking the Religious Writing of Harriet Beecher Stowe

Emma Utzinger*, Claudia Stokes

Author of the enormously popular anti-slavery novel, *Uncle Tom's Cabin*, Harriet Beecher Stowe is one of the most prominent writers of 19th-century America. Stowe was also deeply engaged with the religious teachings of protestant America, having published extensively on the topic, both in periodical and book form. These works unearth the religious and interpretative authority that Beecher Stowe and her contemporary women writers had.

As a student researcher, I have engaged with many of Stowe's religious writings, helping Dr. Claudia Stokes prepare the first scholarly edition of these largely forgotten works. I have also been researching the life of Stowe and how she influenced the literary and religious culture of her time. Though women were not allowed in the ministry, Stowe and her contemporaries left their mark on feminist religious thought through their publications. I have helped Dr. Stokes proofread and annotate Stowe's 1877 book, *Footsteps of the Master*. Stowe reclaims Jesus as a feminist figure, interpreting scripture for a female audience and drawing out the feminine nature of Jesus himself.

Additionally, I have researched The American Tract Society and Stowe's relationship with their publications. The tract society was the largest distributor of religious pamphlets in America, evangelizing using mass-produced printed materials. Many of Stowe's works, specifically "Earthly Care: a Heavenly Disciple" (1850), were circulated by the tract society. By looking into the tract society, I examine how Stowe became an influential figure of religious authority specifically through her engagement with 19th-century mass media. Women authors' relationship with the American Tract Society has been left relatively unexamined, but it offers a great window into the complexities of American print culture, the world of women's religious interpretation and Harriet Beecher Stowe's extensive body of writing.

Determining the Effects of Pre-messenger RNA Splicing in Retinitis Pigmentosa

Brittany Uwaezuoke*, **Cadence McCammack***, **Adam Abou El Nour***, **Yves Iuera***,
Marina Vargas, Corina Maeder

Retinitis Pigmentosa (RP) is a disease that affects as many as 1.5 million people worldwide and is associated with photoreceptor cell degradation. It is characterized by progressive loss of vision and pigmented spots on the retina. It is associated with eight splicing factor proteins that help assemble the spliceosome, namely PRPF31 and PRPF6. The spliceosome helps facilitate the removal of introns and ligation of exons to produce mature mRNA. It has been shown that some missense mutations in PRPF31 and PRPF6 are the leading causes of the autosomal dominant form of RP. The purpose of this study is to characterize how missense mutations in PRP31 and PRP6 affect pre-mRNA splicing within yeast and mouse rod photoreceptor cells (661W).

PRP31 functions to recruit the tri-snRNP to the pre-spliceosome complex, an essential part of the splicing process. PRP6 is a 102 kDa splicing protein associated with U5 of the U4/U6.U5 tri-snRNP that functions to stabilize the spliceosome and prevent premature splicing. Previous work has shown that missense mutations cause abnormal localization of PRP31 and PRP6 within the nucleus. Therefore, it is hypothesized that these mutations affect the localization of these splicing factors and impair assembly of the tri-snRNP.

Initial work focused on introducing these mutations within *S. cerevisiae*. Four *prp6* and eight *prp31* mutations were constructed using PCR-based mutagenesis and growth assays were performed to investigate their effects. Additionally, we pursued a more complex cell model cell culture, which may be a better model to observe the effects of these mutations. Therefore, we introduced the mutations into mouse photoreceptor 661W cells and performed Western Blot analysis, immunofluorescence imaging, splicing assays, and growth assays to determine protein expression and cell shape. We will present our results from these studies.

Funding Source: Welch Foundation, Voelcker Foundation, Wheeler Foundation

Buena Gente y Esperanza: An Analysis of Community and Non-Profits

Kai Velasquez*, David Spener

This summer, I had the great opportunity to work at the Esperanza Peace and Justice Center, a non-profit arts organization dedicated to social justice and intersectional issues. As a queer, Chicana woman, I went into the experience with an eager heart and open mind, ready to learn and unlearn all that was going to be sent my way.

At Esperanza, I first learned the reality of the non-profit world—as multifaceted and complex as it is. I saw the faces of the overworked, the underpaid, and those who were seemingly immovable in tradition. On the other hand, I was also able to take part in the creation of spaces that reflect marginalized communities in ways that they had possibly never seen before. Esperanza gave an insight to the realities and the optimism that exist within the nonprofit world.

Esperanza also nurtured my understanding of community, as a concept and as an experience. At Esperanza, I learned that community is so much more than living on the same street or within the same zip code. It is the ability to look at someone, despite all the differences and distance that may be between you, and choose to stand with them. Though not perfect, it is a powerful choice that can often make all the difference.

Oxytocin Modifies the Strength of Inputs to Dopamine Neurons in the Ventral Tegmental Area

Carmine Villarreal*, **Angela Allen***, Kah-Chung Leong, Gerard M.J. Beaudoin III

The mesolimbic pathway is regulated partly by dopaminergic neurons located in the Ventral Tegmental Area (VTA). This circuit is implicated in reward seeking behavior and is critical for substance use disorder. While dopaminergic neurons can fire tonically through neuronal ion channel interactions, rewards and cues predictive of rewards induce changes in dopamine release via inputs on dopamine neurons. Recent evidence from Dr. Leong's lab has shown that the neuropeptide oxytocin decreases drug seeking behavior. We hypothesize oxytocin is curbing drug seeking by decreasing the strength of excitatory inputs and increasing the strength of inhibitory inputs to dopaminergic neurons in VTA.

To assess the effects of oxytocin on the strength of synaptic inputs to dopamine neurons, we recorded miniature excitatory and inhibitory postsynaptic currents (mEPSCs and mIPSCs) using whole-cell electrophysiology. Miniature currents were recorded in the presence of the neurotoxin tetrodotoxin (TTX), which blocks voltage-gated sodium channels and inhibits the spontaneous firing of action potentials.

Baseline results were recorded with oxytocin washed in, and with an oxytocin receptor antagonist, each at 5 minute intervals. Our results demonstrate that oxytocin significantly decreases the frequency of mEPSCs, suggesting a reduction in release probability. The amplitude of mEPSCs did not exhibit significant changes across conditions. Furthermore, application of an oxytocin receptor antagonist reversed the effects of OXT, returning the mEPSC frequency to baseline levels. Results suggest that OXT plays a role in reducing the output of excitatory inputs.

Our electrophysiological data supports the hypothesis that OXT decreases excitatory inputs to dopaminergic neurons in the VTA which highlights oxytocin's potential as a pharmacological and therapeutic treatment for addiction to natural rewards and drugs of abuse.

Funding Sources: McNair Scholars, Brain and Behavior Research Foundation, Groff Foundation, Trinity University Biology and Psychology Departments

Assessing cognition in infant marmosets (*Callithrix jacchus*) with eye-tracking technology

Ashwini Vivek*, Kimberley Phillips

Across many species, looking time paradigms allow for investigation into different cognitive traits of interest, including social preference or comprehension of physical properties. By measuring how long an animal looks at an object or scene, and where the animal looks, violation of expectation tasks are used to determine what is surprising to an animal, revealing the animal's understanding of social or cognitive information. Eye-tracking technology allows for precise quantification of looking times in these paradigms and has been used in a variety of species including humans, canines, and non-human primates. The common marmoset (*Callithrix jacchus*) is of particular interest in cognitive research due to the similarity in aging patterns between marmosets and humans. Eye-tracking technology provides another method through which the cognitive capabilities of marmosets may be measured with potential use in aging studies. We developed a protocol for testing marmosets with eye-tracking technology to assess their cognitive performance on preferential looking and violation of expectation tasks. We piloted these tests with adult marmosets and will begin to test infant marmosets this fall; specifically, we will examine infant marmosets' understanding of physical properties by measuring looking time when viewing different physical scenarios with either expected or unexpected outcomes. This infant cognitive data will be part of a larger study focused on developing biobehavioral profiles for the infants.

Funding Sources: Murchison Fellowship, Trinity University Capital Equipment Grant

Pneumatic Exoskeleton Implementation for Self-Resisting Exercise

Mary Whaley*, Emma Treadway, Rachel Vitali

As space travel continues and astronauts embark on longer space missions, new solutions are being developed to address the issue of muscle atrophy for astronauts who live in microgravity environments for extended periods. The current solution to combat the deterioration of the muscles includes an exercise regimen which is costly and time-consuming. We propose an alternative solution by incorporating a soft pneumatic exoskeleton into the astronaut's suits that can provide constant self-resistance for targeted muscle groups. We designed a soft pneumatic exoskeleton using TPU actuators and attached two actuators on the inner and outer crease of a Vive elbow brace which is connected via a closed fluid circuit. Participants performed a series of exercises without the exoskeleton in the vertical axis under the influence of gravity, and with the exoskeleton in the horizontal axis to simulate a microgravity environment. By using electromyography, we are able to measure the muscle activity of the biceps, triceps, wrist extensors, and wrist flexors to determine the peak muscle activity with and without the exoskeleton. Each participant underwent four sessions in the exoskeleton and repeated the exercises at low, medium, and high pressures to determine the optimal pressure threshold to simulate a gravitational force in a microgravity environment. When comparing the participant data, we hope to see a similarity in the EMG responses between the vertical exercises and the horizontal exercises. By integrating our soft pneumatic exoskeleton design into the astronauts' suits, there is potential in maintaining muscular health during long-space flights.

Funding Source: Murchison Fellowship

How we Teach and Remember the Alamo

Cass Williams*, Lauren Turek

This past summer, I had the opportunity to work alongside various educators and history enthusiasts at the Alamo as an education intern. As a major historical landmark, the Alamo represents an important symbol of Texas history, hosting thousands of tourists and hundreds of students every week. Although the teaching of Alamo history is met with some controversy, it is clear that the current Alamo staff have dedicated themselves to telling a story that is both accurate and inclusive. This is what I have admired most about my colleagues. They have stressed the importance of teaching an unbiased narrative and the preservation of historical structures.

As an education intern, I worked closely with the whole education department, helping them with various tasks. For the first week, I devoted my time to learning the Alamo history and shadowing field trip tours until I felt confident enough to lead my own group of students. It felt surreal to have young people look up to me and trust me to answer their questions and teach them a history that is very complicated and nuanced. Along with leading tours, I also helped with education events and did history research that would aid in educational programming. My most recent assignment was to read Stephen F. Austin's diary entries depicting his first visit to Texas, a 25 page primary source, and condense it into less than 2 pages. I also did extensive research on the Long Barrack (the oldest man made structure in Texas) during the post battle era, also known as the mercantile era.

Working at the Alamo has given me the opportunity to have hands-on experience in the museum industry. It has been exciting to learn what it takes to run a historical site that is as iconic as the Alamo.

Mutating D111 in the Cu_A protein to Determine the Reactivity of Ligating Histidines to Chemical Modifiers

Maddie Belvis *, Wyatt Wisdom *, Laura Hunsicker-Wang

The electron transport chain (ETC) is a series of four protein complexes that couple redox reactions and the formation of an electrochemical gradient that leads to the formation of ATP. The electrons go through a chain of proteins (Complexes I- IV) with increasing reduction potentials and causes a release in energy. Complex IV, oxidizes cytochrome *c* and transfers the electrons to oxygen, the final electron acceptor. Complex IV in *Thermus Thermophilus* contains two heme groups and two copper sites in Subunit I and Subunit II. The primary focus for this project is Subunit II, where the soluble domain of the protein contains the binuclear Cu_A site. The Cu_A center contains two copper ions bridged by two cysteine thiolates; each copper is additionally coordinated by two histidine nitrogen atoms. Experiments have focused on the copper site and reactivity of the ligating, solvent exposed His 157. D111 is hypothesized to have a role in the reactivity of the ligating, histidine 157 because D111 is hydrogen bonded to the other ligating histidine. By mutating Asp 111 to asparagine, alanine, and serine, the change in proton exchange and reactivity of the histidine 157 can be determined by chemically modifying the mutants with diethyl pyrocarbonate (DEPC), 4-hydroxyl-trans-2-nonenal (HNE), and 4-oxo-2-nonenal (ONE). DEPC is a commonly used chemical modifier but is not present in biological systems. HNE and ONE are endogenous lipid peroxidation products. High levels of reactive oxygen species (ROS), oxidize nearby membrane lipids. HNE and ONE are such products that act as toxic second messengers of oxidative stress and covalently modify lipids, proteins, and DNA. The modifications on *Tt*Cu_A mutants by DEPC, HNE and ONE will provide more conclusions about the reactivity of the ligating histidines and thus possible sites of modification *in vivo* during oxidative stress.

Funding Source: Trinity University Chemistry Department, Welch Foundation, McGavock Fund

Kinetic Analysis of Sulfite Loss Mechanisms in Aqueous Solutions

Jackson Witkow*, **Marco Botello***, Rebecca Rapf

The chemistry of sulfur in natural environments and the atmosphere plays a key role in determining the habitability of a planet. Understanding the reactivity of reduced sulfur species under anoxic conditions has implications for the origins of life on the prebiotic Earth and other planetary environments. Specifically, it is important to understand the behavior of the sulfite ion in aqueous solutions by studying the kinetics of its loss mechanisms, disproportionation, and photolysis, as well as characterizing the resultant products. We have developed key analytical methods to determine the concentrations of various sulfur species over time, using both UV-Vis and Raman spectroscopy. Raman spectroscopy, in particular, is a non-destructive technique, which will allow for repeated measurements under anoxic conditions. In addition, we will use colorimetric assays to serve as a complementary analytical technique. Here we report on the development and commissioning of all three methods. Together, we will be able to quantify the limit of detection for sulfur species, allowing for an accurate measurement of sulfite degradation kinetics, with applications to origins of life chemistry and astrobiology.

From PIDventory to Ping-Pong: Understanding Placemaking in Downtown San Antonio

Jillian Wold*, Jacob K. Tingle

This summer, I had the pleasure of interning for El Centro San Antonio, or Centro for short. Centro is a 501(c)4 nonprofit placemaking organization with the goal to create a more beautiful, playful, welcoming, and prosperous city center in downtown San Antonio through clean and safe services, economic development, and urban activation. Working at Centro allowed me to experience many firsts, including: my first 40 hour work week, my first change in leadership, and my first time truly experiencing the city center. I was able to utilize my interpersonal skills to develop relationships while improving on others such as tech fluency and thriving through uncertainty.

My internship with Centro specifically focused on the urban activation portion of their efforts. I worked closely with my supervisor Elizabeth Burt, the Director of Urban Activation and Play, and Victoria Zamora, the Creative Content and Experience Coordinator, on multiple projects and events benefiting the downtown community. These ranged from cleaning up in Peacock Alley, to applying for placemaking grants, to creating an inventory of underutilized public space within the Public Improvement District (PID) that I have lovingly dubbed: the PIDventory. My time with Centro has caused me to fall in love with downtown and appreciate the time and effort it takes to make space feel welcoming, comforting, and happy. I have grown to look at and think about space in a whole new light. Through ping-pong tables in the office brightening the work day and parties in an alley providing opportunity for play, I have learned how the strategic creation of place can impact the health, happiness, and overall well-being of a community.

Funding Source: Arts, Letters, and Enterprise Program

Oxytocin attenuates stress-induced responding for oxycodone under a progressive ratio schedule in male rats

Taylor Q. Yates*, Ryan J. Rager-Aguiar*, Kah-Chung Leong

Instances of Opioid Use Disorder (OUD) are both prevalent in occurrence and significant in impairment caused. Stress is a major component in the expression of OUD, increasing drug use, craving, and likelihood of relapse. Oxycodone is a commonly abused prescription opioid and use is highly susceptible to stress effects. Therefore, pharmacological interventions need to be explored to combat the negative effect of stress on oxycodone abuse. The neuropeptide oxytocin has been shown to be a potent anxiolytic compound and may be utilized to diminish the effect of stress on drug reward. The present study will investigate the ability for oxytocin to attenuate the effect of the pharmacological stressor yohimbine on oxycodone reward salience and motivation of oxycodone-seeking behavior. To better mirror the use of oral oxycodone in human abuse, male rats were trained to lever respond in operant conditioning chambers for oral self-administration of oxycodone. After stabilization of behavioral response for at least two sessions, the effect of stress on oxycodone-seeking was measured through systemic administration of the pharmacological stressor yohimbine (2 mg/kg; i.p.) 30 minutes prior to a progressive ratio (PR) test. Our results found that yohimbine increased lever responding and break point for oxycodone in male rats, thus demonstrating stress-induced motivation of oxycodone-seeking. Concurrent oxytocin, administered systemically (1 mg/kg; i.p.) attenuated the effect of yohimbine, reducing lever pressing and breakpoint. Subsequent experiments investigated the role of the central amygdala (CeA) in mediating this attenuating effect of oxytocin. Overall, our results demonstrate the potential therapeutic effect of oxytocin in diminishing the negative effect of stress on oxycodone addiction behavior.

Funding Source: Murchison Fellowship

ConnectABILITY: Restoring Hope Through Civic Engagement

Gabriela Yeackle *, Carl Leafstedt

This summer I worked as a program management intern at disABILITYsa, a non-profit organization serving the San Antonio community by striving to educate, advance, and engage people of all abilities through fostering the exchange of information and promoting independence and inclusivity. disABILITYsa was a great fit for me because I was able to develop professional skills in a non-profit setting that I have a passion for.

As a program management intern, I was able to work on various projects, giving me the chance to become familiar with several of our biggest programs. I reached out to clinics and pharmacies in the San Antonio area to promote our Disability-Friendly Healthcare Provider Workshop, which aims to lower barriers faced by individuals with disabilities in healthcare environments. I compiled a volunteer database to assist in recruitment and engagement. I also organized a contact list consisting of hundreds of potential exhibitors for our annual resource fair.

In order to accomplish these and other projects, I learned how to use platforms such as Datablist, Monday, Slack, Jotform, and Basecamp as well as become more proficient in Excel, Google Sheets, and Canva. By attending resource fairs and community events with Janice Perez, our Community and Outreach Director, I became familiar enough with programs like the Disability-Friendly Healthcare Provider Workshop that I could discuss them with both community members and other non-profits. Because of the confidence I gained from talking about what disABILITYsa offers, I greatly improved my networking skills. I began the summer with three broad goals, each of which was met: see how non-profit organizations operate on a daily basis, learn how to network in professional settings, and become familiar with a variety of softwares and programs that are likely to be utilized in multiple career fields.

Become a Conservation Hero: Utilizing Citizen Science for Wildlife and Habitat Preservation

Thor Alexander Yeary*, James Shinkle

During my internship at The Nature Conservancy, I contributed to various aspects of the organization's work, learning from and collaborating with experts from many academic and professional backgrounds. The Nature Conservancy is a global nonprofit that protects and conserves natural habitats and biodiversity. I applied for this internship because of my passion for wildlife conservation and desire to make a tangible impact in the field.

The most significant project during my internship involved utilizing iNaturalist, a dynamic data collection tool and citizen science platform, allowing users to share their observations of various species. The platform's global reach facilitates extensive data collection, providing insights into species distributions and ecological trends. Using this tool, the organization can more effectively update its list of species visiting or residing in their various preserves across Texas. Maintaining up-to-date species lists is crucial for conservation planning and management, enabling The Nature Conservancy to monitor biodiversity changes, evaluate conservation efforts, and communicate the ecological importance of their preserves. During this project, I sought different professionals' expertise to ensure my methods' accuracy. Additionally, I had the privilege of training other interns on contributing to the project, fostering collaboration and knowledge-sharing within the team. I gained project management experience and demonstrated my leadership skills by initiating this new project for the organization.

My internship with The Nature Conservancy provided insights into conservation work's complexities. It reinforced the notion that successful conservation efforts require a collaborative and interdisciplinary approach involving the contributions of many professionals, including scientists and researchers. Using iNaturalist demonstrated how technology and citizen science can be powerful tools in engaging a broader community in conservation initiatives, allowing for efficient data collection, species documentation, and overall impact. This experience highlighted the value of citizen science in expanding our knowledge and empowering individuals to contribute to conservation efforts actively.

Funding Source: Arts, Letters, and Enterprise Program

Diversifying the Narrative: Oral Histories of Asian-Americans in the Westside of San Antonio

Lily Zeng, Rita E. Urquijo-Ruiz

Oral histories are platforms for community members' voices to be elevated and empowered. The mission of this project is to highlight the breadth of vitality, strength, and diversity in the Westside neighborhood of our city. As a Chinese-American Global Latinx Studies major, I am looking for the beauty and empowerment of intercultural interactions and lived experiences. I hope to find narratives about Chinese-Mexican creatives, the "American Dream" of social mobility, and the Asian diaspora into the San Antonio area. These transcriptions will be shared with the Westside and greater San Anto community in the Museo de Rinconcito – for public education and public knowledge. My internship experience centers around uplifting humanity in all forms: people of all identities and backgrounds, breaking down social class barriers, and empowering our communities, especially the most vulnerable and unheard. My intention with the project is to share the richness of their stories so that we can create a space to relate, listen, learn, empower, and process.

A New Summer at SAYSi: From Student to Intern

Dalex Zenteno*, Rita E. Urquijo-Ruiz

This summer, I had the opportunity to work at the non-profit organization, SAYSi, which helps young artists (middle and high school students) become empowered artists and confident leaders. As an alumni of the program this is my 5th year at SAYSi and my 3rd year as a mentor. Additionally, I am a member of the SAYSi' union. My active involvement in this non-profit organization has allowed me to experience the way the program has been impacted by COVID and different management styles. For the majority of the time I was a student first but this summer I have grown as a teacher and mentor. Additionally, my focus prior to my internship had been on theater, but this summer I stepped outside my comfort zone by joining the visual arts program.

My internship required me to create a mini zine for the students on Oil Painting, gather research materials for the students, deconstruct a gallery, help students with projects and create project examples. I have also had the opportunity to attend mentor workshops, teaching artist workshops, and union meetings. I am currently working on a presentation for the students on the way their current project topic, labor rights, relates to the Latinx and Chicanx experiences. This poster will explore how as an intended art and communications major with an interest in education, my time at SAYSi has offered me new skills for my future career and an opportunity to see the way in which this organization approaches education and how it compares to my own experience as an alumni of the program.

Key to Employability for Business Analytics Undergraduates: Evidence from LinkedIn Data

Xinyi Zhang*, Tianxi Dong

LinkedIn has widely emerged as a professional social networking for recruiting purposes, benefiting employers and job seekers. This study examines the impact of using LinkedIn profiles on the entry level job employability for Business Analytics undergraduates in the United States.. The Key to Employability model encompasses 5 crucial measurements: Career Development Learning, Work/Life Experience, Degree Subject Knowledge (Understand & Skills), Generic Skills, and Emotional Intelligence. These measurements are evaluated based on 8 different sections in LinkedIn. A wide variety of twenty-six universities across the U.S. have been analyzed based on a confirmatory factor analysis and multiple regression so far. The findings underscore the indispensable effect of the "About," "Work Experience Duration," "Honor," and "Profile Completeness" sections on entry-level employability in the field of business analytics. Notably, "Work Experience Duration" has the highest impact with employability. A comprehensive "About" section in the Emotional Intelligence viewpoint will positively assist undergraduates in employability as well. Additionally, Career Development Learning plays a vital role in facilitating entry-level opportunities, with profile completeness serving as a key indicator. Although "Profile Completeness" significantly affected "Full Time", only 4% of the sample had completed the profile. Half of the undergraduate finished basic information, suggesting LinkedIn was recognized by college students but not fully functioning. By investigating the relationship between LinkedIn profiles and employability factors, this research provides insight for students in wisely completing their profiles. It also contributes to a further understanding of the role played by LinkedIn in hiring in the business analytics field.

Trinity University is grateful to the following organizations and donors for their support.

80/20 Foundation
Impetus Foundation
Arnold and Mabel Beckman Foundation
The Flora Cameron Foundation
Donors to the John Donahue Award
Michael P. Doyle and Janice Doyle
The Hearst Foundations
Imogene* and Harold* Herndon
Patrick and Alinde Harris
Tim* and Karen Hixon
Donors to the Howland, Eggen, and Pitts Computer Science Student Summer Research Fellowship
Tim* and Joan Jenkins
Kay* and David Jordan
Mr. E. Carey Joullian, IV '82 and Mrs. Carol Joullian
The J.K. Lee Family Foundation
The Steven P. Mach Family
The Family of James Augustus McCloskey, Jr.
Donors to the William C & Ina Beth McGavock Memorial Fund
Ronald E. McNair Scholars Program
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