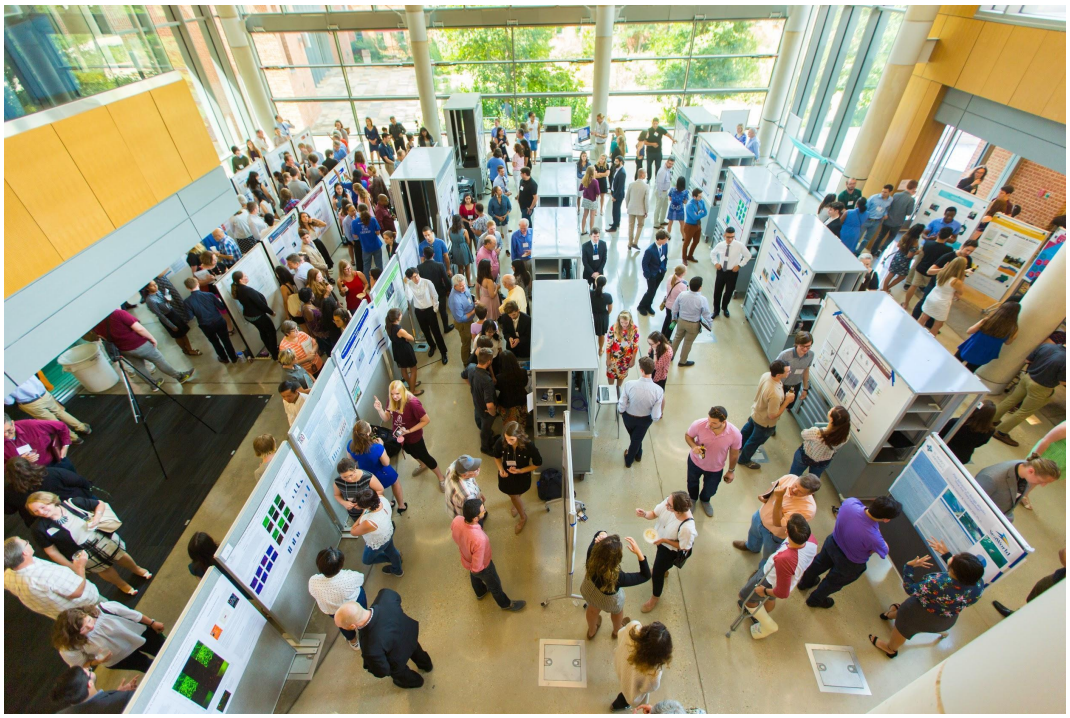
Center for Experiential Learning & Career Success

TRINITY UNIVERSITY

Summer Research & Internship Symposium

July 21-22, 2022



38th Annual
Department of Chemistry
Research Symposium

17th 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 2022, 186 students engaged in summer research including through the Stumberg Summer Accelerator program. This year the Symposium also features 36 internship students from the Arts, Letters, and Enterprise (ALE); Mexico, the Americas, and Spain (MAS); and the John Donahue Social Justice programs. Summer research and internship students this year have been mentored by more than 81 faculty mentors across 33 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 2022 Summer Research and Internship Symposium!

LadyStacie Rimes-Boyd (Assoc. Dir, Campus Relations) & **Katie Ramirez** (Director)
& the Center for Experiential Learning and Career Success Team

Conference Agenda

Thursday, July 21, 2022		
8:45-9:15 AM	Welcome & Keynote Address: Cole Callen ‘18	Stieren
9:30-10:30 AM	Coffee, Mingling & Check-in	CSI 256
10:45 AM-12:15 PM	Multidisciplinary Oral Presentation Session #1A	CSI 437
	Multidisciplinary Oral Presentations Session #1B	CSI 430
12:00-1:30 PM	Lunch Available	CSI Atrium
1:45-3:15 PM	Multidisciplinary Oral Presentation Session #2A	CSI 430
	Multidisciplinary Oral Presentation Session #2B	CSI 437
3:30-5:00 PM	Reception featuring remarks by Dr. David Ribble (AVP of Academic Affairs: Budget & Research) & Poster Session #1	CSI 256/282
Friday, July 22, 2022		
8:30-9:30 AM	Coffee & Pastries	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 170
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- 3:15 PM	Multidisciplinary Oral Presentation Session #4A	CSI 430
	Multidisciplinary Oral Presentation Session #4B	CSI 437
3:15 - 4:35 PM	Chemistry Oral Presentation Session #4	Stieren

Poster Session #1
Thursday, July 21, 3:30-5:00 PM
Center for Sciences & Innovation 256/282 (Design Cube)

#	Presenter(s)	Title	Mentor(s)
1	Estefania Andrade, Sabrina Cuauro-Cuauro, Anoushka Dani & Natalia Santos	Correlates of Internalized Weight Stigma in Food Insecure Populations	Becker
2	Shelby Atherton, Elena Negron & Rachel Poovathoor	Nonprofits and Entrepreneurship: FARO: Projects for Global Education	Martinez
3	Paloma Diaz-Minshew	Shakespeare en Spanglish: Borderlands Theatre	Santos
4	Anna Miller, Riley Ruchti, Abby Ottaway, Andrew Walker & Rain Wammack	Does it Take a Village to Keep LGBTQ+ Youth Housed and Supported?	Stone
5	Meagan McKee & Swathisri Ravi	The Effects of Varying Levels of Fibrin on Astrocyte Behavior using a 3D Engineered Scaffold	Munoz-Pinto
6	Jacob Avina	Evaluation the Potential of Astrocyte-Derived Coatings for the in vitro Culture of Human Neural Stem Cells	Munoz-Pinto
7	Nicola Ferguson & Mahika Desai	Comparative Studies on the Physiology and Motility of the Flagellate Bacteria *Escherichia coli and Pseudomonas aeruginosa*	Healy
8	Alexandra Garcia, Joey Hersh, Max Hightower & Ashwin Ramesh	ReCap: Spend With Purpose	Aramanda
9	Sophia Ebel & Roxana Castor	Identifying Novel Neurodegenerative Disease Related Pathways of Lipid Phosphatase Fig4	Strunk
10	Benjamin Gustafson & Benjamin Jeffers	A Class of Mapping Tori are Automatic	Macura
11	Anna Gonzalez	Modulating the Differentiation of Human Neural Stem Cells in 3D Contexts by Varying Hyaluronic Acid Chain Length	Munoz-Pinto
12	Jacob Bruce	A Muffled Voice: Underserved Teens in San Antonio and	Carlisle

		Plans For The Future	
13	Angela Graf, Aakriti Acharya, Thuong (Lucy) Pham & Amber Lewis	Understanding Protein-Induced Membrane Damage of hIAPP in Lipid Nanodomains using Multiscale Modeling and Simulations	Cheng
14	Eva Buergler	The Bard in the Borderlands: José Cruz González's Invierno	Santos
15	Camille Heidelbaugh	Self-Assist with a Soft Pneumatic Self-Powered Exose	Treadway
16	Lydia Heisel	On a Mission: Intersecting Nonprofit and Public Sectors	de Antunano
17	Evan Farrell & Alice Dang	Induction of Differentiation of HT22 Cells via Removal of Sera and Addition of Pro-Neural Factors	Beaudoin
18	Audrey Jennings	Modeling Fault-Related Fracturing Associated With a Segmented Normal Fault: Implications for Geothermal Energy Potential	Surpless
19	Austin Klein* (with #47)	Trinity's drainage and the wider history of Environmental Justice in San Antonio	Hazleton
20	Cutter Canada, Gwendolyn McCrary, Megan McGuire & Lauren Stevens	Transgender and Non-Binary Experiences During the Pandemic	Delwiche, Gallin-Parisi, Stone
21	Anna King	Determining if Fab1 Mutants that Cause a Growth Advantage Alters Association with fig4	Strunk
22	Noah Fulcomer	The Effects of Different Amyloid Beta (Aβ)-based Species on the Human Microglia-mediated Inflammatory Response in 3D Multicomponent Interpenetrating Polymer Networks (mIPNs)	Munoz-Pinto
23	Madison Horn & Lili Quiroga	Creation and Development of CadPlexin, A Novel Chimeric Protein for the Selective Destruction of Synapses	Beaudoin
24	Grant Kramer	The Importance of Cognitive Control in Preventing Positive Romantic Illusions	Hertel, McIntyre
25	Megha Neelala & Aaron Elfezoaty	Hemisphere-Specific Characterization of Glutamatergic Projections from the Pedunculopontine Tegmental Nucleus to Substantia Nigra pars Compacta Dopaminergic Neurons	Beaudoin
26	Piper Swearengin, Zoe Baker & Lynzie Kutsner	Testing Noun and Verb Learning with the Same Stimuli: Does Context Matter?	Childers
27	Daisy Rodriguez	Overcoming Class, Social, Academic and Cultural Barriers to Obtaining a Higher Education	Delgado

28	Thuong Lucy Pham & Amber Lewis	Applying Machine Learning to Investigate Lipid Domain Formation Behaviors in the presence of Amyloidogenic Proteins	Cheng
29	Jasper Neath	Using Geomechanical Modeling to Test a Segmented Fault System	Surpless
30	Ariana Castillo	Building The Bridge from High School Graduation to College Matriculation	Delgado
31	Maeve Armand	Understanding the Covenant Chain	Kramer
32	Taylor Crow	Mental Health Care for All: “One Youth and One Family at a Time”	Childers
33	Ivanna Bass Caldera, Sam Carr & Anusha Sharma	Amehya: The StrollerBackpack	Martinez
34	Sarah Davis	Growing from the Ground Up: A Summer at Green Spaces Alliance	Carlisle
35	Aakriti Acharya, Angela Graf & Lucy Pham	Computer Modeling and Analysis of the Human Tau Binding to Neuronal Membrane	Cheng
36	Sophia Hedley	The Importance of Sexual Health Education in Texas	Hermann
37	Zoe Flores	Food Insecurity in Our Community	Montoya
38	Araceli Gonzalez	Understanding Youth Scholar Experiences in a Educational Pathways Project	Aleman
39	Susan Cleary, Jennifer Ha, Michael Haysley & Coby Wellman	Exploring Methodological Approaches for Plant and Fungal Endophyte Competition Studies	Lyons
77	Nadia Crawford	Fluorogenic RAFT Polymerisation as a Detection Assay	Cooley

Poster Session #2
Friday, July 22, 11:30 AM - 12:30 PM
Center for Sciences & Innovation 256/282 (Design Cube)

#	Presenter(s)	Title	Mentor(s)
40	Lauren Dotson	Investigating a Potential Link Between the Lipid Phosphatase Fig4 and MAP Kinase Pathways in Neurodegenerative Diseases	Strunk
41	Garrett Greiner & Logan Martinez	Multi-Dimensional Interpretable Interaction Network (MDiiN)	Zhang
42	Daniela Gonzalez	Cocaine Diminishes Fear Conditioning Acquisition in Female Rats	Leong
43	Grace Anderson	How Does Testosterone Change Muscle Physiology? An Experiment in Two Lizard Species	Johnson
44	Anthony Bishop, Marriana Sayen & Hamzah Khuram	Transforming the Shoulder Rehabilitation Process With The Range Regenerator	Martinez
45	Emily Jamieson	A Garden-Based Education: My Summer with Gardopia Gardens	Lyons
46	Akshaya Ranjit	Brain Laterality in the Social and Visual Processing System of the Green Anole Lizard	Johnson
47	Izzy Clint* (with #19)	Economic Incentives and Water Management in San Antonio	Hazleton
48	Alondra Flores	Working to End Domestic Violence in San Antonio	Vélez Salas
49	Adrian Herrera	Robotic Sampling: Motor Mounting Project for Rover	Nickels
50	Jackson Froehlich	Recording and Predicting Freezing of Gait Events in Parkinson's Disease Patients with a Smartwatch	Horn
51	Mia Kholy	The Role of the Third Eye in Lizard Reproduction: A Study of Brain and Behavior	Johnson
52	Paige Langford, Joelle MacDonald & Caroline Strong	Provenance of the Mariposa Formation, CA	Surpless
53	Thao(Katherine) Hoang & Cora Lewis	The Effect of Long-Wave UV Radiation on the Gene Expression of Human Astrocytes	Munoz-Pinto
54	Josi Tesauro & Nathaniel Ledbetter Ferrill	Environments and Timing of Dolomitization of the Yangtze Platform in the Nanpanjiang Basin, South China	Lehrmann

55	Eva Lorenz	Males, but not females, prefer a socially-paired context over a cocaine-paired context in a conditioned place preference paradigm	Leong
56	Aliya Lackan	Oxytocin Decreases Contextual Fear Expression via the Central Amygdala	Leong
57	Amber Lewis & Thuong (Lucy) Pham	Computational Analysis of Surface Induced Protein Folding of Human Islet Amyloid Polypeptide (HIAPP)	Cheng
58	Leah Marsh	Why Doing Nothing Can Mean Everything: How Sit Spot Practices in Nature Influence College Students' Mental Well-Being	Barnett
59	Chase Moye	The Effects of Oxytocin Administration Directly into the Dorsal Hippocampus on Cocaine Seeking Behavior in Male Rats	Leong
60	William Blaine Martin	Esperanza, Paz, y un mejor Futuro Para Todo El Mundo : The Esperanza Center's Work to Build A Better Future for All	Vélez Salas
61	Marco Boisselier, Matthew Lopez	Social and Neurometabolic Contributions to Cognitive Decline	Phillips
62	John Clark	Creation of a novel transsynaptic labeling system using Notch/Delta from a Nematode?	Beaudoin
63	Sirui Zhang	Servicing the Invisible: An Enabling Experience at disABILITYsa	Leafstedt
64	Andrea Cruz	Modeling Colloidal Surfaces using the Method of Regularized Stokeslets	Nguyen, Shindell
65	Amaya Seidl & Matthew Lopez	Cortisol Levels Across the Lifespan in Common Marmosets (Callithrix jacchus)	Phillips
66	Carmine Villarreal	The Effects of Oxytocin on Dopaminergic Neurons	Beaudoin
67	Miranda Mittleman	Haptic Communication and Role Negotiation Through a Social Dance Connection	Treadway
68	Ashwini Vivek, Amaya Seidl & Marco Boisselier	Variability in hair cortisol among adult baboons	Phillips
69	Elizabeth Speegle	Simplified Model of a Bacterium in Stokes Flow	Nguyen
70	Nelson Rose & Jean Masini	An Overview of Pacific Debate Institute	Marinez
71	Zachary Moyer	Improving Choanoflagellate Model Using Regularized Segments	Nguyen

72	Moraima Rodriguez Guerrero & Alyssa Baldwin	Hemisphere-Specific Characterization of GABAergic Projections from the Pedunculopontine Tegmental Nucleus to Substantia Nigra pars Compacta Dopaminergic Neurons	Beaudoin
73	Cecilia Parker	Is relationship-induced self-concept change associated with attachment security? Examining the attachment security enhancement model	McIntyre
74	Nadia Kern	Growing Healthy Communities with Gardopia	Lyons
75	Jeremy Blackburn	How Can You Tell If an Animal is Stressed? Behavioral and Physiological Correlates of Stress in Captive Green Anole Lizards.	Johnson
76	Taylor Black	The Evolution of Lizard Dentition: Small and Short Faced Anolis Lizards	Johnson

Oral Presentations: Multidisciplinary Session #1A
Thursday, July 21, 10:45 AM-12:15 PM
Moderator: Jennifer Rames
CSI 437

#	Time	Presenter(s)	Title	Mentor(s)
1	10:45	Savannah Wahlgren	The Portrayal of Mothers in Ovid's *Metamorphoses*	O'Sullivan
2	11:00	Hannah Currie, Sarah Williammee	A Summer at Transplants for Children: Beyond the Medicine	Tingle
3	11:15	Madeleine West	Re-imagining Auschwitz in Graphic Narratives	Aarons
4	11:30	Azariah Anderson	Activism and The Impact of Christian Spirituality on Identity of Black Athletes	Crooms
5	11:45	Jade Bondy	The Bridge Between the Humanities and Nature	Shinkle
6	12:00	Grace Goerig, Sidney Strickland, Isabel Grimsinger	What is a Socially Conscious Consulting Firm?	Dupertuis

Oral Presentations: Multidisciplinary Session #1B
Thursday, July 21, 10:45 AM-12:15 PM
Moderator: Ericka Navarro
CSI 430

#	Time	Presenter(s)	Title	Mentor(s)
7	10:45	Erin Burns, Michael Dixon	X-ray Observations of Supernovae	Pooley
8	11:00	Elizabeth Coughlin	X-Ray Observations of Gravitationally Lensed Supermassive Black Holes	Pooley
9	11:15	Madison Reich	X-Ray Observations of FUor Outbursts: Extreme Accretion Episodes in Young Stars	Pooley
10	11:30	Jocelyn Brooks	Parental Mediation of Identity Media: Creating a Scale to Assess Parent/Child Interactions with Race, Gender, and Body Image Media Content	Densley

11	11:45	Dakotah Brown	Interning at The San Antonio African American Community Archive and Museum	Leafstedt
12	12:00	Reece Brown	Constructing an Inexpensive Angstrom-Resolution Wavelength Meter	Ugolini

Oral Presentations: Multidisciplinary Session #2A
Thursday, July 21, 1:45-3:15 PM
Moderator: Sinclair P. Caesar III
CSI 430

#	Time	Presenter(s)	Title	Mentor(s)
13	1:45	Dennis Butts	Referred Haptic Feedback in Digital Extenders Intubation Device	Treadway
14	2:00	Abrianna Citta	Economic Development in Downtown San Antonio: Catalyzing Growth	Tingle
15	2:15	Patrick Coan	Black Borderlands: The Costs of Slavery for Enslavers	Hoy
16	2:30	Henry Couch	Reactivating Downtown, One Block at a Time	Tingle
17	2:45	Audrey Davis	Trace Element Mobilization and Attenuation in a Crude Oil Contaminated Aquifer	Ziegler
49	3:00	Andra Key	Fabrication and Characterization of Nanopattern Gold Substrates to Support FRET Enhancement	Steele

Oral Presentations: Multidisciplinary Session #2B
Thursday, July 21, 1:45-3:15 PM
Moderator: Ericka Navarro
CSI 437

#	Time	Presenter(s)	Title	Mentor(s)
18	1:45	Thảo Đinh	The Face and Voice of Gemini Ink: Marketing For a Nonprofit	Carlisle
19	2:00	Evan Engelhaupt	Using DNA to Precisely Position Fluorescent Molecules Above a Nano Patterned Gold Substrate Which Supports Surface Plasmons	Steele
20	2:15	M. Kent Hamatani	A Practical Recipe on How to Gerrymander	Balreira
21	2:30	Harrison Hartman	"All They Ever Were Was Themselves": American Climate Fiction and the Privileged Escape	Hazleton
22	2:45	Audrey Herrera	Modality Switching in Online Dating: Exploring Online Daters' Goals and Information Seeking Strategies Prior to Meeting Face-to-Face	Sumner
23	3:00	Gisselle Hluz	Christian Nationalism in the Museum of the Bible	Spigel

Oral Presentations: Multidisciplinary Session #3A
Friday, July 22, 9:45 – 11:15 AM
Moderator: Sinclair P. Caesar III
CSI 430

#	Time	Presenter(s)	Title	Mentor(s)
24	9:45	Andrew Jett	What actors Determine People's Authoritarian Values: The Evidence from Fourteen Asian Societies	Chen
25	10:00	Kate Borgmeyer	The Art and Science of Audience Engagement: Lessons from a Museum Intern	Tingle
26	10:15	Omarree Kimbrough	Modeling the Glass Transition With Biomimetic Surfaces	Shindell

27	10:30	Ava Kirchen	Plats, Policy and Protection: My Summer at the Greater Edwards Aquifer Alliance	Shinkle
28	10:45	Mariaignacia Larrain	The Impact of Storytelling as a Persuasive Communication Tool in Consumer Settings	Gonzalez-Fuentes
51	11:00	Madison Lee	From the Ground Up: Learning the Ins and Outs of Nonprofits at Magdalena House	Leafstedt

Oral Presentations: Multidisciplinary Session #3B
Friday, July 22, 9:45 – 11:15 AM
Moderator: Ericka Navarro
CSI 437

#	Time	Presenter(s)	Title	Mentor(s)
29	9:45 AM	Youngone Lee	Ear Canal Deformation Based Head Gesture Recognition	Tan
30	10:00 AM	Dean Zach	Towards a Scholarly Edition of the Religious Writings of Harriet Beecher Stowe	Stokes
31	10:15 AM	Vex Maxwell	Silence Like Thunder: Queerness at Museum of the Bible	Spigel
32	10:30 AM	Cole McGuire	Deep Learning for Gene Function Prediction in Yeast	Hibbs
33	10:45 AM	Sofía Muñoz	Museum Curation and Representation: What does it look like for a curator to amplify marginalized voices?	Turek
52	11:00 AM	Jordan Frederick	Conservation: How Preserving our Lands Preserves us	Shinkle

Oral Presentations: Multidisciplinary Session #3C
Friday, July 22, 9:45 – 11:15 AM
Moderator: Jennifer Rames
MMS 170

#	Time	Presenter(s)	Title	Mentor(s)
34	9:45 AM	Mark Nickels	Spatial and Statistical Analysis of Groundwater Contaminants in California's Central Valley	Ziegler
35	10:00 AM	Gabriel Ogden, Paul Kim, Lucas Riley*, Alfonso Kamel	Starting a Business as Engineers in the Music Sector	Martinez
36	10:15 AM	Polina Protozanova	Examination of the Relationship Between Public Transit Availability and Unemployment Rates in San Antonio, Texas	Vega
37	10:30 AM	Julissa Ramirez	An Overview of Access to the Fine Arts in Urban Centers	Noor & Ritson
38	10:45 AM	Vanessa Silva	Working in the Curatorial Department: Exhibition Preparation, Gallery Installation, Research, and Archives	O'Rourke
50	11:00 AM	Kenneth Nelson	Islamaphobia and Europhoia in Cyberspace	O'Brien

Oral Presentations: Multidisciplinary Session #4A
Friday, July 22, 1:45 – 3:15 PM
Moderator: Ericka Navarro
CSI 430

#	Time	Presenter(s)	Title	Mentor(s)
39	1:45 PM	Clara Smartt, Ellie Curran, Matvei Popov	Wherezy: Providing a Sense of Security for Parents	Martinez
40	2:00 PM	Corrinne Tallman	The Many Hats of a Nonprofit: My Internship with YOSA	Leafstedt
41	2:15 PM	Eduard Thompson	DisABILITYsa - My Summer Interning For A Great Cause	Leafstedt
42	2:30 PM	Victoria Torres	Bacterial Motor Mechanics	Shindell, Nguyen & Healy

43	2:45 PM	William Turner	Figurative Language in The Iliad	Cook
53	3:00 PM	Marielle Sambilay	The Publishing Process: Internship with Trinity University Press	Payton

Oral Presentations: Multidisciplinary Session #4B
Friday, July 22, 1:45 – 3:15 PM
Moderator: Jennifer Rames
CSI 437

#	Time	Presenter(s)	Title	Mentor(s)
44	1:45 PM	Catie Vaccaro	Investigating Baboon Immunity to SIV Infection	Giavedoni
45	2:00 PM	Cass Williams	Summer Internship: Building Community at the Carver Community Cultural Center	Tingle
46	2:15 PM	Ever Whitlock	The Importance of Women: A Look Into Haudenosaunee Women's Roles in Politics	Kramer
47	2:30 PM	Caroline Wolff	From Lede to Layout: My Journey Into the World of Journalism	Guerrero
48	2:45 PM	Madeleine Hesselgesser	Development and Validation of Immunoassays for Non-Human Primate Samples	Giavedoni
54	3:00 PM	Malik Ross	"Silver Lining: Neighborhood Gentrification and Community Reformation"	Sanchez

38th Annual Department of Chemistry Research Symposium
Friday, July 22 | Stieren Theater

8:35 AM Introductory Remarks
Chemistry Session 1 ● 8:45-10:20 AM
Moderator: Dr. Becky Rapf

#	Time	Presenter(s)	Title	Mentor(s)
1	8:45 AM	Noah Gilbertson and Elizabeth Batchinsky	Synthesis of Second-Generation Disease Targeted ROS Activated Prodrugs	Cooley
2	9:05 AM	Aaron Lee	RNA Transcription Optimization for use in In Vitro Splicing Assays	Maeder
3	9:20 AM	Macy Oyala and Jess Rugeley	Synthesis and Purification of α-Keto acids	Rapf
4	9:40 AM	Queen Polin and Maddie Belvis	Mutating D111 in the CuA protein to Determine the Reactivity of Ligating Histidines to Chemical Modifiers	Hunsicker-Wang
5	10:00 AM	Sarah Chang, John Fontenot, and Lauren Kimberly	Minimal Affinity Tags	Urbach

Chemistry Session 2 ● 10:35 AM-12:10 PM
Moderator: Dr. Ryan Davis
Stieren Theater

#	Time	Presenter(s)	Title	Mentor(s)
6	10:35AM	Alex Bradley, Kendal Southwell and Dovydas Vasiliauskas	Understanding Differential Reactivity at Non-Heme Iron-Sites Using Metallopeptide-Based Mimics	Shearer
7	10:45AM	Anabelle Conde, Olivia Bowen, Richard Dunn and Larissa Tinajero	Investigating the Autocleavage Activity and Stability of Spliceosomal Proteins Yeast Dib1 and Human Dim1	Maeder

8	11:00AM	Dana Sheehan	Classification of Plant Exudates via Solution-State NMR Spectroscopy	Lambert
9	11:25AM	Abby Smith and Gia Campolo	Characterization of α-Keto Acids at the Air-Water Interface	Rapf
10	11:40AM	Nicholas Cipolla	Fluorogenic ATRP as a Novel Polymerization Kinetic Assay	Cooley

Chemistry Session 3 ● 1:30-3:00 PM
Moderator: Dr. Jason Shearer
Stieren Theater

#	Time	Presenter(s)	Title	Mentor(s)
11	1:30PM	Connor Buchanan and Taylor Fate	Supramolecular Controlled Release	Urbach
12	1:50PM	Teresa Palacios-Diaz, Katie Morton, and Anna Olinger	Exploring the Physical and Chemical Properties of Levitated Microdroplets	Davis
13	2:10PM	Jessica DuVon	Amino Terminal Truncations Of The Protein Dib1	Maeder
14	2:25PM	Elaine Kaster, Curtis Wong and Hanna Flemmel	Synthesizing a Water-Soluble, Fluorogenic Monomer Probe Utilizing SuFEx Click Chemistry	Cooley
15	2:45PM	Devin Saenger	Determining the Effect of Amino Acid Changes on the Reduction Potential of the Rieske Protein from Thermus thermophilus	Hunsicker-Wang

Chemistry Session 4 ● 3:15-4:35 PM
Moderator: Dr. Christina Cooley
Stieren Theater

#	Time	Presenter(s)	Title	Mentor(s)
16	3:15PM	Tim Mose and Denver Talley	Wavelength dependent Photochemistry of Bulk Phase Polycyclic Aromatic Hydrocarbons	Rapf
17	3:35PM	Graycen Hall and Sonja Lisowski	The Possible Effects of Rieske Reduction Potential on Superoxide Formation in the bc1 Complex	Hunsicker-Wang
18	3:55PM	Nadia Crawford and Maggie Karim	Optimization of Photoinitiated Fluorogenic Polymerizations for Detection	Cooley
19	4:15PM	Malcolm Gavigan and Caroline Myers	Understanding the Effect of Retinitis Pigmentosa on RNA Splicing	Maeder

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 <u>underlined</u> are current faculty mentors.

Poster Session Presentation 35

Computer Modeling and Analysis of the Human Tau Binding to Neuronal Membrane

Aakriti Acharya*, Angela Graf, Lucy Pham, Dr. Cheng

Early aggregation events of amyloid proteins, e.g., Amyloid ß and tau, on cell membranes are responsible for the progression of amyloid diseases such as Alzheimer's. It is known that the early-stage, nanoscale, and partially ordered amyloid aggregates are more toxic than the mature, micron-size, and ordered fibers in Alzheimer's. However, the processes of forming membrane-toxic amyloid aggregates on nanostructured membrane surfaces are unknown.

Using computer simulations, my study aimed at investigating the binding events of tau-aggregate of different sizes to highly dynamic and heterogeneous lipid nanodomains, or lipid rafts. Our lipid rafts are composed of phase-separated cholesterol- and negatively charged phosphatidylserine (PS)- nanodomains that mimic the nanostructures of neuronal membranes inside neurons. In this study, we investigated three forms of the human tau, a small 73-residue long tau fragment known as the fibril core, and two 130-residue long fragment known as WT (Wild Type) and MBD (membrane bound deficient). This summer project was a continuation of an ongoing research and so for most of my time I worked in scripting for higher level analysis known as ODD (order, domain, density), time stack and minimum binding distance. While I conducted these analyses and simulations, I was able to utilize MD simulation tools such as GROMACS, VMD, etc. and nurture my skills in various programming languages such as Python and Shell. Our results ultimately provide new insights into the molecular details of tau-binding and induced toxicity to the neuronal membranes.

Funding Source: Murchison Fellowship

Activism and The Impact of Christian Spirituality on Identity of Black Athletes

Azariah Anderson*, Dr. Brandon Crooms

From the killings of unarmed Black bodies by White men to the systemic racism that continues to keep people of color oppressed, the year 2020 was a year of awakening and upheaval. Frustrated Americans including Black athletes have chosen to unite to demand justice despite White supremacists and nationalists' resistance towards racial equality. In addition to the mental and emotional stress of sports performance-related pressure (Beamon, 2008), racial stigmas (Simon, 2007), and accepting the call of becoming a social activist, "woke" Black professional athletes and student-athletes are also experiencing the challenges of navigating the new reality of one of the world's worst pandemics in 100 years (Graupensperger et al., 2020). Historically, religious faith has had a potent influence on African Americans' identity development (Harrison et al., 2011; Dancy, 2010). Although research shows that religious faith has a positive effect on mental health, the spiritual development of Black athletes is often undervalued and misinformed (Lewis, 2008).

The data for this project originated from a recorded panel interview of two African American international professional basketball players that discussed their spiritual journey through the global pandemic and civil unrest in the U.S in 2020. From a male and female Christian perspective, the athletes spoke on the intersection of race, sport, and religious faith based on their reflections and insight as Black professional athletes. The athletes also shared their awakening of social injustice in America, choices of activism outside, perceptions of Blackness from a global context, privileges of being an athlete, the burden of the professional athlete status, and the consciousness of their faith and its influence on their social awareness. Results of this study could provide new knowledge on the social behaviors and motivational factors towards the engagement of activism as an athlete.

Funding Source: Mellon Initiative

How Does Testosterone Change Muscle Physiology? An Experiment in Two Lizard Species

Grace E. Anderson*, Sam Afshari, Jesus Vega, Nathan Koehler, Brittney M. Ivanov, Dr. Michele A. Johnson

Testosterone regulates a variety of sexual and social behaviors in animals. However, we do not know exactly how it affects muscle physiology, or whether different muscles respond to testosterone in similar ways. The muscles involved in reproduction in male *Anolis* lizards offer an excellent model in which to explore these questions. Two sets of sexually dimorphic muscles control behaviors regulated by testosterone and are likely targets of physiological change. These are the retractor penis magnus (RPM), which retracts each hemipene during copulation, and the ceratohyoid muscle (CH), which controls the dewlap, an extendable throat fan that signals aggression or sexual motivation in anoles. Adult males of two anole species (green and brown anoles) were divided into three treatments (low testosterone, high testosterone, and unmanipulated control). Previous analyses in our lab on these two species show that muscle *size* does not change as a function of testosterone, but behavior *involving* reproductive muscles (RPM, CH) did, more in green anoles than brown anoles. Here, we used succinate dehydrogenase (SDH) and Myosin ATPase stains to categorize muscle fibers as fast-glycolytic, fast-oxidative-glycolytic, slow-oxidative, or tonic. A darker SDH stain indicates increased oxidative potential in a muscle fiber, while a darker myosin ATPase stain indicates greater muscle contraction velocity. If testosterone directly affects muscle fiber type, then we expect there to be little difference between muscle fiber type composition between species with the same testosterone treatments. If testosterone indirectly affects muscle fiber type composition, perhaps by means of a behavioral mechanism, the compositions may vary as a function of behavior. This study will contribute to our understanding of hormonal influence of behavior and physiology in vertebrates.

Funding Sources: Trinity University Biology Summer Undergraduate Research Fellowship (BSURF), Trinity University Department of Chemistry, National Science Foundation (IOS 1257021 to MAJ)

Poster Session Presentation 1

Correlates of Internalized Weight Stigma in Food Insecure Populations

Estefania Andrade*, Sabrina Cuauro*, Anoushka Dani*, Natalia Santos*,
Dr. Carolyn Becker

Recent research indicates that internalized weight stigma and food insecurity are associated such that individuals living with the highest levels of food insecurity (FI) report higher levels of internalized weight stigma. One possible reason for this is that FI is associated with increased weight, which increases the likelihood of people receiving weight-stigmatizing messaging. FI is defined as having insufficient access to food in both quantity and quality, whereas weight stigma refers to negative attitudes or beliefs about individuals living in higher weight bodies. Receiving weight-stigmatizing messages (including outright weight discrimination) may lead to the internalization of weight stigma. The aim of this research is to examine psychological correlates of internalized weight stigma (IWS) in individuals living with FI.

Significant research has demonstrated that weight stigma and IWS both contribute to poorer psychological and physiological functioning (e.g., anxiety, diabetes). However, most of the existing research has focused on White, reasonably affluent populations, thus neglecting those of lower socio-economic and racial/ethnic minority status. The aim of the present work-in-progress study is to investigate previously identified correlates of weight stigma/IWS in the context of food insecurity. Consistent with the extant literature, we hypothesize that weight stigma will correlate with IWS as well as adverse physiological and psychological outcomes.

Participants (target $N = 1000$) were recruited from the San Antonio Food Bank and asked to complete a questionnaire regarding their level of FI, IWS, experiences of weight-based discrimination, eating disorder pathology, anxiety, depression, current medical conditions, and quality of life. Results of this study may provide useful information to food justice advocates since the food justice community often targets obesity, which is inherently weight stigmatizing. Thus, the project's findings may demonstrate that weight-stigmatizing or anti-fat approaches to promoting health are inadvertently adding to the health concerns that advocates are trying to ameliorate.

Funding Sources: McNair Scholars Program, Murchison Research Fellowship

Poster Session Presentation 2

Nonprofits and Entrepreneurship: FARO: Projects for Global Education

Shelby Atherton*, Elena Negron*, **Rachel Poovathoor*,** Dr. Luis Martinez

Not every child has been told that they can change their local communities for the better. When it comes to the global issue of plastic pollution, children lack tools and opportunities to address these issues. FARO: Projects for Global Education seeks to empower students by equipping teachers with the necessary curriculum and materials needed to bring inspiring, innovative lessons to students. FARO creates lesson plans for teachers that empower students to take action in their local communities. FARO is a social enterprise filed as a 501(c)3 that focuses on creating curricula and books for elementary-age children regarding global issues like plastic waste and sustainability.

FARO: Projects for Global Education has been in the works since the summer of 2021. Since then, we have participated in Trinity's Stumberg Venture Competition Seed Round and now, Stumberg's Summer Accelerator. Through the eight-week accelerator program, FARO has better defined our market and product, and refined our skills to effectively network and showcase our business plan. The curriculum is interdisciplinary and project-based intended for elementary aged students covering the topics of plastic waste and environmental awareness. FARO's companion children's book is set in Ecuador and brings global relevance to issues that are present in every local community. FARO: Projects for Global Education plans to pilot our curriculum and children's book in the fall at Bonham Academy in the San Antonio Independent School District. Our organization will also compete in the Stumberg Venture Competition Finals in October 2022 in plans to win the grand prize $25,000 to fund our full pilot launch in partner schools including the introduction of our curriculum and book inside 12 classrooms, locally and abroad.

Funding Source: Stumberg Competition Summer Accelerator and F.W. Olin Fund for Entrepreneurship E-Team

Evaluation the Potential of Astrocyte-Derived Coatings for the in vitro Culture of Human Neural Stem Cells

Jacob Avina*, Carson Koch, Andrea C. Jimenez-Vergara, PhD[2], Travis Jackson Block, PhD[3], Dany Munoz-Pinto, PhD[1,2]

The in vitro study of neurological diseases is difficult particularly due to the low and limited proliferative capacity of central nervous system (CNS) cells. Neural stem cells (NSCs) have emerged as a promising alternative solution to this challenge. These cells have the capacity to proliferate in large quantities and differentiate in vitro into neurons, astrocytes and oligodendrocytes under the right cell culture conditions. Traditionally, NSCs are expanded in vitro using surfaces coated with induced pluripotent stem cells (iPSC) derived proteins or poly-L ornithine (PLO). In this work, we characterized and evaluated the effects of a new surface coating derived from the extracellular matrix (ECM) deposited by human astrocytes (HAC) on the proliferation and phenotypical modulation of NSCs of human origin. The results were compared with the behavior of NSCs cultured on conventional surface coating from iPSC and PLO. Initial results indicate a significant increase in the proliferation rate of NSCs on HAC coated surfaces relative to the traditional coatings. In addition, the expression of the neural stem cell markers Sox2 and Nestin expressed by NSCs on HAC was consistent with the expression of NSCs in the traditional coatings.

Funding source: This work was supported by a grant from the Alzheimers's Association and Alzheimer's Texas (AARGD-17-531470).

Amehya: The StrollerBackpack

Ivanna Bass Caldera*, Anusha Sharma, Sam Carr*, Dr. Luis Martinez

This summer, the Amehya co-founders, Ivanna Bass Caldera, Anusha Sharma, and Sam Carr, entered the Stumberg Accelerator program with the product idea of a StrollerBackpack, a stroller that converts into a functioning backpack. Their mission was to develop a lightweight, compact and multi-functional stroller that would ease the life of busy caregivers. Throughout the process they met with patent lawyers, design firms, conducted customer discovery interviews, and worked on incorporating their newfound knowledge into their pitch. A big change for the team was their team name. Initially they were called Baby To Go but once they spoke to lawyers from Geekdom, they realized the name was too similar to other baby-related businesses. This is where the team took the largest pivot. Reevaluating their name made them reevaluate their overall mission with this project. Each founder comes from a unique background and they wanted to demonstrate that when rebranding. They came up with the name Amehya, which means boundless and powerful non-male leader, in sanskrit. Sanskrit is the classical language of South Asia, where Anusha grew up. The team's end goal is to license their product idea; however this rebranding has allowed them to recall their values and stick to them while learning about licensing contracts. They also learned about the importance of customer validation. Although they focused on customer discovery interviews, they plan on asking caregivers what they think of the StrollerBackpack to get direct feedback.

Funding Source: Trinity Entrepreneurship Stumberg Competition

Transforming the Shoulder Rehabilitation Process With The Range Regenerator

AJ Bishop*, Marriana Sayen*, and Hamzah Khuram*, Dr. Luis Martinez

This Summer Range Rehab LLC worked to study the deficiencies in the shoulder rehabilitation process, the commonality of shoulder injuries and shoulder pain in America, and refining our solution. We found that shoulder injuries are one of the most common and painful injuries sustained by Americans that can cause a lifetime of discomfort. Statistics from the National Center for Biotechnology show that 20% of medium tears, 40% of large tears and 60% of massive tears result in a retear within 15 months of surgery. These statistics show that there is a clear deficiency in the shoulder rehabilitation process, and lack of effective shoulder treatment. The Range Regenerator, product of our parent company: Range Rehab is a patented Class 1 physical therapy device that aims to transform shoulder rehabilitation. The Range Regenerator features two uniquely sized arches with a separate collar affixed upon each arch. The arches are mounted upon a wooden base. In the use of this new physical therapy tool, a patient simply grips a collar and then moves it along the arch, thus exercising the four rotator cuff muscles in coordination with the scapula. Patients operate the device within a safe and controlled range of motion, thus ensuring that there is little risk of overexertion, eventually allowing for patient use without physician supervision. The technology works both the posterior and anterior shoulder muscles with active range of motion via shoulder flexion/extension and abduction/adduction as well as the internal and external rotation of the rotator cuff muscles.

Funding Source: F.W. Olin E-Tean Endowment.

The Evolution of Lizard Dentition: Small and Short Faced Anolis Lizards

Taylor N. Black*, Thomas J. Sanger, Dr. Michele A. Johnson

Vertebrate teeth serve a variety of functions, including initiating the digestive process, serving as weapons, or acting as tools to manipulate objects. Despite their importance, we know little about how tooth morphology evolves as the size of the jaw evolves. *Anolis* lizards offer an excellent model to address this question, as all anoles are insectivores who utilize their teeth to capture their prey, and they have evolved remarkably variable jaw shapes. In order to determine how tooth number, length, and width have changed or been conserved, we focus on the 30 species exhibiting diversity in snout lengths. To do this, we use the tool 3D Slicer to measure CT scans from 3 specimens of each species. We collect total tooth count from the upper jaw of each specimen. From the left and right sagittal positions of each scan, we measure the lengths and widths of five of the back (tricuspid) and five of the front (unicuspid) dentition, and the distance between these teeth. Preliminary data suggest that, as expected, species with larger jaws have more teeth present. These data will provide a novel understanding of how dentition evolves in the vertebrate jaw.

Funding Source: Trinity University Biology Summer Undergraduate Research Fellowship (BSURF) and Texas Ecolab

How Can You Tell If an Animal is Stressed? Behavioral and Physiological Correlates of Stress in Captive Green Anole Lizards.

Jeremy Blackburn*, Mia Kholy, Akshaya Ranjit, Grace E. Anderson, Taylor N. Black, and Dr. Michele A. Johnson

Laboratory research with captive animals requires that animal subjects be healthy. Studies on stress and welfare are common among captive mammals and birds, yet rare in other taxa. Despite their frequent use in biological research across the world, little is known about the welfare and stress of captivity on the green anole lizard (*Anolis carolinensis*). In particular, we wonder if behavioral assays reflect physiological stress? In this study, we attempt to find a correlation between increasing stress levels and the measurable behavioral traits of captive green anoles. We captured 40 free-living green anoles (20 males, 20 females) and collected fecal samples to assess natural levels of stress via fecal corticosterone metabolites. Half of these animals were then assigned to the "stress" group, which were exposed in captivity to a series of known stressors (handling, transfer to new cages, and behavioral arena trials). The other half were assigned to the control group, which lived in captivity but were not further manipulated. Across the study, we collected undisturbed behavioral data and fecal samples. At the end of the study, we will collect blood smears to measure the heterophil to lymphocyte levels, a measure of long-term (i.e.,several days) stress. We propose to use these results so that future green anole welfare studies can use a better understanding of how to collect a reliable measure of lizard stress based on behavioral patterns instead of current invasive stress measuring techniques.

Funding Source: Texas Ecolab, Trinity University office of Academic Affairs

Social and Neurometabolic Contributions to Cognitive Decline

Marco Boisselier*, Matthew Lopez*, Dr. Kimberley A. Phillips*

Loneliness has been implicated in age-related cognitive decline. However, the extent to which separation from a long-term partner contributes to cognitive decline has not been thoroughly examined. Common marmosets (*Callithrix jacchus*) are among the few primates that display similar long-term association with a mate. This characteristic, along with genetic similarity to humans, makes them a powerful comparative model of cognitive decline. In this ongoing study we are investigating the effects of loneliness and social buffering on cognitive and neurometabolic decline.

Cognitive performance was measured via the detoured reach and staircase tasks. Detoured reach assesses response inhibition and the Staircase task assesses visuospatial integration. Both tasks provide a behavioral indicator of executive functioning. Subjects were given assessments during a 3-month baseline period before being separated from their partners for 3 months. To test the effects of social buffering, animals either remained separated from their partner or received a novel partner. After 3 months, animals were reunited with their original partner. The non-novel partner group showed decreased cognitive performance during the separation phase, which continued to decrease during the reunion phase. Subjects paired with a novel-partner displayed an increase in cognitive performance during the separation phase. These results suggest that a partner provides buffering of the effects of loneliness on cognition.

Neurometabolic dysregulation is another key contributor to the aging process and may be affected by loneliness. Positron emission tomography (PET) imaging provides a unique ability to quantify this dysregulation by measuring glucose reuptake within the hippocampus and cortical regions, illustrating neurometabolic activity. To do this we will utilize the radiotracer ^{18}F-FDG (2-deoxy-2-18F-fluoro-D-glucose), which acts as a glucose analog being absorbed by the cell and trapped for visualization. We hypothesize that hypometabolism of hippocampal and prefrontal cortical regions will correspond with a decrease in cognitive performance.

Funding Source: NIA R01 AG064091

The Bridge Between the Humanities and Nature

Jade Bondy*, Dr. James Shinkle

This summer I served as a monitoring intern at The Nature Conservancy (TNC) in Texas as part of the Arts, Letters, and Enterprise program–an interdisciplinary program dedicated to enabling students to gain business literacy, through Trinity University. The Nature Conservancy is a nonprofit that aims to protect native species, land, and water, as well as spread awareness about the important role conservation and biodiversity plays with respect to climate change. As a monitoring intern, I inserted TNC monitoring data into spreadsheets, updated preserve documentation summaries, assisted collecting fieldwork data, and completed various individual projects. These projects include conducting online research and writing a summary on Silky Bluestem, collaborating with two other interns to create a StoryMap on TNC oyster conservation work, and creating a data analysis report on Old World Bluestem.

Completing these tasks and projects broadened my perspective on the intersection between the humanities and conservation science; it allowed me to understand how my background in social sciences and biology can be applied to TNC. This internship taught me the importance of utilizing a broad range of skills essential to different fields–from management, to economics, to ecology, to public health, in conservation-oriented nonprofits. It also showed me how integral communication is for the success of an international nonprofit like TNC. I developed a better understanding of the steps between collecting fieldwork data to presenting information to peers, and gained familiarity using arcGIS, Excel, iNaturalist, and Outlook. This presentation will walk through the work I completed during my time with TNC, touching upon the professional skills I gained from the experience, in addition to emphasizing the interdisciplinary culture of The Nature Conservancy.

Funding source: Arts, Letters, and Enterprise

Understanding Differential Reactivity at Non-Heme Iron-Sites Using Metallopeptide-Based Mimics

Alex Bradley*, Kendal Southwell* and Dovydas Vasiliauskas*, Dr. Jason Shearer

Mononuclear non-heme iron (mnhFe) dioxygenase enzymes conduct a broad range of vital chemical reactions. Two notable examples include cysteine dioxygenase (CDO) and isopenicillin-N-synthase (IPNS) which have very similar unoxidized active site structures and coordinate O2 to form a highly reactive Fe(III)-O2- intermediate. Despite their close active site structural similarities, the two enzymes proceed through different reaction pathways and lead to the formation of largely different products: CDO oxidizes sulfur of a coordinated cysteine residue, whereas IPNS conducts a hydrogen abstraction reaction. Metallopeptide-based mimics of CDO and IPNS active sites were synthesized to investigate the reasons behind the differential reactivity of the two enzymes. Spectroscopic studies (UV-vis, S K-edge XAS, and LC-MS) and computational calculations (PBE0/def2-tzvp/d3) suggest that CDO and IPNS undergo different reaction pathways because of geometrically-restricted substrate orientation with respect to the active site. In CDO, the highly reactive superoxo- moiety orbitals are in one plane with the active S(3p) orbitals, and can thus attack and oxidize the cysteine substrate, whereas in IPNS, the S(3p) orbitals lie orthogonally to the superoxo- orbitals, are inaccessible for the sulfur oxidation event and cause the superoxo- moiety to instead abstract a hydrogen from other targets within the active site. The findings open new directions for computational and spectroscopic investigations of mnhFe dioxygenase reaction thermodynamics, kinetics, and mechanisms.

Funding source: NIH, NSF, Trinity University

Parental Mediation of Identity Media: Creating a Scale to Assess Parent/Child Interactions with Race, Gender, and Body Image Media Content

Jocelyn Brooks*, Dr. Rebecca Densley

As current media conditions have made content increasingly accessible and sophisticated, children and adolescents are engaging in media more than ever. Moreover, many children's media have evolved to address complex issues surrounding identity such as race, gender, and body image. However, while we know that parents engage in various mediation strategies in order to increase the positive and decrease the negative media effects on kids, the extent to which parents mediate identity-focused media is unknown. Applying Protection Motivation Theory (PMT), which argues that parental mediation can be predicted by the perceived threat of the content and the belief in the effectiveness of relative coping mechanisms, our project seeks to understand how and when parents are mediating identity media and how such tactics differ from those used during their own upbringing. Because no measurement of these practices currently exists, we created a new scale, the Parental Mediation of Identity Media Scale (PMIM), to measure parents' interactions with their children surrounding media content about race/ethnicity, gender, and body image. Additionally, since socialization and strength of identity have been shown to influence media content consumed, we adapted previous scales to measure the degree of parents' and children's identification with their race, gender, and body. Future work will analyze this data and draw relevant conclusions.

Funding Source: Mellon Initiative

Interning at The San Antonio African American Community Archive and Museum

Dakotah Brown*, Dr. Carl Leafstedt

This summer, I had the privilege of interning at the San Antonio African American Community Archive and Museum (SAAACAM). SAAACAM is a relatively new organization created with the mission to collect, preserve, and share the cultural heritage of African Americans in the San Antonio region. I applied to this internship through the Arts, Letters, and Enterprise program at Trinity University, and luckily, it is the second internship I have participated in through this program; the first being at the Carver Community Cultural Center for African Americans. This internship was another incredible opportunity to work with a nonprofit organization, specifically created to aid the black population of San Antonio. As an Anthropology major interested in working with the public, as well as an African American Studies minor, this internship could have not been a better fit for me. As a general intern at SAAACAM, I was tasked with a variety of assignments and was involved with multiple projects. This included aiding in research, rewriting current research materials, managing administrative work, coordinating with volunteers, and mostly everything behind the scenes of a short-staffed organization.

As I worked at SAAACAM, I developed and practiced many skills. Initially, there was the unsaid expectation for everyone at this organization to be flexible, collaborative, and passionate. Because of this, I felt that I truly thrived at SAAACAM. To be specific, I worked under the Historian, aiding in her research, under the Volunteer Coordinator, collaborating on working events, and under the Program Director, making sure the entire operation ran smoothly. With that, I practiced daily my collaboration skills, along with my skills in being self-sufficient and making my own decisions. I appreciated so much that I was trusted to do my tasks without constant supervision despite my role as an intern. In all, I developed my understanding of the intense demand and hard work needed to run a nonprofit, specifically with a small number of people. It is truly amazing how elbow grease can build up an entire well-respected and well-known organization. I was inspired by the work I saw being done as well as the work I participated in at SAAACAM. This internship was an incredible learning experience where I grew as an individual and worker. I will be forever grateful for my time at SAAACAM and never forget this experience.

Funding Source: Arts, Letters, and Enterprise

Constructing an Inexpensive Angstrom-Resolution Wavelength Meter

Reece Brown*, Dr. Dennis Ugolini

This research project aims to create a lower-cost tool to measure the wavelength of an unknown laser to a precision of 0.1 nanometers. Splitting a laser with a known wavelength into two beams along two different paths and collecting both beams at a single diode produces interference. By moving mirrors, we change one path length, and we can record the changing fringe pattern. Counterpropagating a laser of unknown wavelength through the same system, we can calculate the unknown wavelength from the ratio of the rates of change in the fringe patterns. We have two proposed improvements: use the entire intensity pattern rather than counting fringes so that we need less than a tenth as much data and replacing the commercial translation stage with an inexpensive 3D-printed mechanism.

We added a 23LC512 memory chip to our system to increase our data storage capacity from 2k bytes to 64k bytes. We found data recording errors from overheating unless we ran it on the lower end of its operating voltage range. Applying a simple linear fit to the laser phases did not give the target accuracy. Using that linear fit, we constructed a difference plot which showed areas of constant slopes which matched the desired levels of accuracy and precision. We took linear fits from subsets of out phase data to get multiple slopes; neither finding the mediod of these slopes nor applying a cluster detection algorithm worked to our target precision. However, by finding consecutive slopes within a predetermined threshold of each other and discarding the rest, the mediod of the remaining slopes allows us to achieve the precision of 0.1 nanometers with 5k data points.

Funding Source: McNair Scholars and Murchison Fellowship

A Muffled Voice: Underserved Teens in San Antonio and Plans For The Future

Jake Bruce*, Dr. Kelly Carlisle

This summer, I was fortunate to have the opportunity to work with Gemini Ink, San Antonio's writing arts center. Gemini Ink's mission is to teach the craft of writing to people of all skill levels, so they can bring their stories to life. This mission is achieved through Gemini Ink's programs, where children, youth, and adults across San Antonio are given the ability to have their voice heard and story told through workshops, writing labs, and larger events. But the reality behind this mission is that it is much harder than it sounds.

One of the most underserved groups in San Antonio is teenagers. During my time at Gemini Ink, I was able to read poems from teenagers residing in Krier Juvenile Correctional Treatment Center. The poems were powerful beyond belief; they told stories that I will never fully be able to understand. I began to wonder about these kids' lives, and futures, and realized that for many their creative journeys end once they get out of Krier. It struck me that there were no easily accessible opportunities available at Gemini Ink for these young writers. Therefore, I began brainstorming ideas for a teen-based writing lab.

Writing labs at Gemini Ink are free, held once a month, and are structured as peer-driven critique sessions for writers to give and receive constructive feedback. Gemini Ink is offering three writing labs this summer, none of which are geared towards a younger population. Therefore, implementing a writing lab for teens to share and receive feedback in a safe and positive environment seemed like a necessary addition to Gemini Inks programs. My poster will reflect what I have learned from the process of creating a non profit project, along with what still needs to be done to execute the writing lab.

Funding Source: Arts, Letters, and Enterprise

Supramolecular Controlled Release

Connor Buchanan*, **Taylor Fate***, Sara Trauth, Dr. Adam Urbach

Even though more than 200 drugs are already on the market, drug formulation and drug delivery is still a large area of research. Researchers are continually working to enhance drugs -- such as by making them more efficient -- in addition to developing new drugs. One area of drug research receiving more attention is the development of controlled-release drugs, which are more commonly referred to as extended-release. Extended-release drugs are formulated to slowly release the desired drug contents into the body over time, thereby making their effect last longer. This is in contrast to typical drugs in which the entire drug content is released at a single time. The advantage of having extended-release drugs available for consumers is that less dosages are required within a given period of time to create the desired effect, which can increase patient compliance and ease of use with long term treatment plans. Unfortunately, the current methods used for the manufacturing of extended-release drugs already on the market only work well with small molecules, meaning that medicine composed of larger molecules can only be taken through the typical immediate-release drug forms. Our research investigates potential methods that would allow the controlled-release of larger molecules. By invoking supramolecular chemistry, we seek to quantify the releases of various molecules and create a foundation through which the formulation of extended-release drugs for larger molecules might be possible.

Funding Source: The National Institutes of Environmental Health Sciences, Trinity University, and Research Corporation for Science Advancement

The Bard in the Borderlands: An Anthology of Shakespeare Appropriations en La Frontera

Eva Buergler*, Dr. Kathryn Santos

My research folds together Borderlands and early modern theater traditions by studying Chicano playwright José Cruz González's *Invierno*, a reimagining of William Shakespeare's late romance *The Winter's Tale*. In the process of studying, formatting, and annotating this text, I have identified various points of intersection where González builds upon and transforms Shakespeare's play to explore Borderlands histories and ways of knowing and living, which I explain and elaborate on in a critical introduction. I argue that González interrogates Shakespeare's assumptions about cycles, women, and language and uses *The Winter's Tale* to reimagine both past and present. This research will contribute to the second volume of the open-access anthology *The Bard in the Borderlands: An Anthology of Shakespeare Appropriations en la Frontera*, which will be published by ACMRS Press in 2024.

Funding Source: Mellon SURF

X-ray Observations of Supernovae

Erin Burns*, Michael Dixon*, Dr. David Pooley

We reduced and analyzed raw data from the NASA's *Chandra X-ray Observatory* and the European Space Agency's (ESA's) *XMM-Newton* observatory to characterize the X-ray emission from the supernova events that result from the collapse of the most massive stars. Using the specialized software provided by each observatory, we created images of the X-ray sky around the supernova and then produced X-ray spectra for each observation of each supernova. For the supernovae that are clearly detected in X-rays, we modeled each spectrum with a hot plasma model in order to determine the luminosity and temperature of the shocked material giving rise to the X-ray. For supernovae that are not X-ray bright, we used the data to set upper limits on the X-ray luminosity. For supernovae observed multiple times, we compiled the luminosity measurements and/or upper limits into a light curve. These results will be used to determine or set limits on the mass-loss history of the pre-supernova stars, thus giving insight into the late stages of stellar evolution.

Funding Source: Murchison Fellowship and Advisor Funding

Referred Haptic Feedback in Digital Extenders Intubation Device

Dennis Butts*, R. Lyle Hood, Dr. Emma Treadway

Intubation is the process of providing oxygen to someone by inserting an endotracheal tube into the trachea. Someone may need intubation in severely traumatic scenarios where they may have trouble getting oxygen. There are two processes for performing intubation: Laryngoscopy and digital intubation. Laryngoscopy, which is the standard method, uses a laryngoscope to perform intubation, while digital intubation uses the fingers to guide the endotracheal tube. Digital intubation is used more in emergency medical settings where there might be no visuals through the airway or a laryngoscope is not available or could harm the patient. There are two disadvantages of digital intubation: its unsanitary nature and the ability for a partially-conscious patient to bite down on the caregiver's fingers. The Digital Extenders is a robotic device that was created with the purpose of being a safer way to perform digital intubation without the disadvantages of unsanitary conditions and high head and neck forces.

The goal of my research this Summer was to enhance the Digital Extenders by adding haptic feedback. I chose to incorporate force feedback in the form of a squeeze band worn on the forearm. The current assumption is that higher force feedback from the Digital Extenders is correlated with fewer head and neck forces during intubation.

To test the usefulness of force feedback, I performed a perceptual experiment. The haptic feedback experiment tested whether force feedback would help people discriminate between different stiffnesses in foam blocks, to simulate the ability to distinguish between different tissues in the mouth and throat. The experiment consisted of different blocks lined up with different stiffnesses. A subject would close their eyes and wear headphones to eliminate auditory or visual feedback. The subject would then press down on randomly selected blocks and tell me which block stiffness they thought the block was.

Funding: Faculty Startup Fund

Poster Session Presentation 20

Transgender and Non-Binary Experiences During the Pandemic

Cutter Canada*, **Gwendolyn McCrary***, **Megan McGuire***, **Lauren Stevens***, Dr. Althea Delwiche, Professor Alex Gallin-Parisi, Dr. Amy Stone

In June 2022, Gallup reported that the percentage of US adults identifying as a member of the LGBT community increased dramatically in the year following the COVID-19 pandemic. According to a Pew Research Center survey also reported in June, approximately 5 percent of young adults in the US identify as non-binary or transgender. Due to the recency of COVID, there is a paucity in literature regarding the combined impact of isolation and social media on people with diverse gender identities. Our central research project comprises how online support networks have affected people who were figuring out their gender identity during the pandemic. We conducted online qualitative interviews with transgender and non-binary people aged 18-40 to learn about their first-hand experiences with online information gathering and communities.

We then explored individual research questions:
1. What role have Twitch and Twitch communities played in transgender/non-binary viewers' identities?
2. TikTok hashtags as tools for information seeking: what is the difference in view count between popular hashtags utilized on TikTok?
3. Which popular transgender Youtube creators were the most compelling for individuals seeking information about gender identity during the shelter-in-place?
4. How have gender-diverse Reddit communities offered support to trans and nobinary people during the COVID-19 pandemic?

We utilized Twitch demographic and community surveys, TikTok demographic analysis, YouTube content analysis, and Reddit community surveys. We hypothesize that online support and representation, coupled with the social isolation of the pandemic, played a key role in the development of an individuals' gender identity. This research is significant because little is known about the ways that dramatic, sudden changes in the physical and virtual world influence identity development and expression. Our findings will illuminate the pivotal role online information and support play for transgender and non-binary communities in times of crisis.

Funding Source: Mellon Institute

Building The Bridge from High School Graduation to College Matriculation

Ariana Castillo*, Dr Rocio Delgado

This summer, I was given the opportunity to work alongside the college counseling team at IDEA South Flores on the Southside of San Antonio. As a school and district, South Flores and its counterparts all have one goal: College for All. I had a chance to see one of the most important parts of this process in action. Matriculation support was happening all day and every day on campus. Whether it was one on one meetings or preparing for a connection event, the South Flores college counseling team gave their all to support their most recent graduates. As a graduate of South Flores myself, I had a realization of how much "behind the scenes" work goes into supporting us on our college journeys even after we graduated. There was never a time I saw any lack of intentionality and compassion within the work of the college counseling team. This was truly inspiring to me as someone who only had the opportunity to be at Trinity because of that same work ethic in my own college counselors because of the community I lived in.

Being part of the IDEA South Flores staff this summer, I gained lots of knowledge in the educational leadership realm when it comes to planning projects and creating connections. I developed proficiency in Excel and Canva as well as improved my communication skills. This poster will explore my experience with the driving goals of South Flores and how I see those goals to be fruitful in the journeys of high school graduates everywhere.

Funding Source: MAS/Alvarez Summer Internship Grant

Fluorogenic ATRP as a Novel Polymerization Kinetic Assay

Nicholas Cipolla*, Dr. Christina Cooley

As polymer chemistry continues to develop, robust and reliable methods are becoming required to monitor reaction kinetics and characterize polymerization progress. Traditional methods include the use of gel permeation chromatography (GPC), viscometry, ^{1}H NMR, or light scattering; however, these all sacrifice the ability to monitor kinetics in real-time. Recent developments including flow chemistry coupled to analytical methods such as mass spectrometry, UV-Vis, IR, or any of these in combination have allowed for continuous, real-time polymer characterization; however, each of these analysis methods require expensive, specialized instrumentation and complex chemistry setups to function. As an alternative to these costly and intricate approaches, we have proposed 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 demonstrated that a fluorogenic monomer probe (anthracene methacrylamide, AnMA) will reveal fluorescence upon incorporation into a growing polymer chain. To begin the development of a kinetic assay, a series of fundamental studies are being performed to observe the relationship between observed fluorescence and degree of polymerization (DP). These studies include incorporating AnMA into a panel of common ATRP monomers to determine how fluorescence changes as a function of DP.

By taking samples at time points throughout the polymerization, DP data (^{1}H NMR) and molecular weight data (GPC) can be examined with fluorescence readouts. These experiments will allow for a comprehensive understanding of how fluorescence corresponds to monomer DP throughout the course of the reaction. Thus far, monomers PEG methacrylate and methyl methacrylate have been analyzed with the intention of extending this approach to styrene, acrylonitrile, and poly(N-isopropylacrylamide). 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 Source: The Welch Foundation and The National Science Foundation

Economic Development in Downtown San Antonio: Catalyzing Growth

Abrianna Citta*, Dr. Jacob K. Tingle

This summer, I had the honor of interning with Centro San Antonio, a placemaking nonprofit downtown. Centro's mission is to make downtown a more playful, prosperous, and beautiful place. I worked in the Economic Development Department and my work focused on promoting downtown as a destination for small businesses to locate. As part of the experience, I attended many city and community meetings, such as: the SAGE Small Business Townhall, the Small Business Advisory Commission meeting and the State of the Tech Industry report. I also witnessed the process of how America Rescue Plan Act (ARPA) funds were distributed. These experiences gave me insight into how Centro advocates for outreach dollars, and how it plays a vital role in helping to connect small businesses with resources like grants.

Along with a fellow intern, the Vacant Retail Spaces project was a primary objective. During the pandemic, many businesses left downtown. To begin the project, we researched how other downtown organizations promote vacant spaces, how they manage their websites, and what design methods seemed to be the most desirable. To complete the project, we walked the entirety of the Public Improvement District—Centro's designated area of downtown—cataloging vacant storefronts. Then, I contacted brokers to confirm availability and collected the necessary information. The vacant storefronts will be promoted on Centro's website to encourage businesses to return or come to downtown.

Overall, I gained insight into how citizens, nonprofits, and business owners interact with the local government to approach comprehensive problems. I learned that the importance of citizen input cannot be overstated. During the presentation I will discuss how I applied what I have learned as an Urban Studies and Political Science major to contemporary developments in San Antonio and how I explored downtown as a place to live, work, and play.

Funding Source: Arts, Letters, and Enterprise

Creation of a novel transsynaptic labeling system using Notch/Delta from a Nematode

John Clark*, Madison Horn, Evan Farrell, Alice Dang, Liliana Quiroga, **Jullian Valadez**, and Gerard M. J. Beaudoin, III

The most important set of technologies advancing neuroscience as a field are transsynaptic labeling systems. These systems allow for careful probing of neural microcircuits which will eventually allow for a complete map of the brain, which will offer valuable insight into the mechanisms underpinning addiction as well as myriad neurological disorders. Current methods of transsynaptic mapping lack in that they are either inefficient in the amount of signal or they are severely cytotoxic. In order to rectify this, a new transsynaptic labeling system has been hypothesized. The system operates using the Notch-Delta signaling system, a system which is activated via contact between two neighboring cells. *C. elegans* analogs of Notch (Glp1) and Nelta (Lag2) proteins were chosen to prevent activation by mammalian versions. A chimeric form of the Glp1 protein was created, which replaced the intracellular portion of the intracellular domain of the Glp1 protein with Cre recombinase, a protein which results in site specific DNA recombination and subsequent expression of inverted genes flanked by its recognition sites. It is hypothesized that when one side of a synapse expresses the Glp1-Cre chimeric protein and Lag2 is on the opposite side of the synapse, cre recombinase will be released from Glp1 and will be able to induce expression of a double floxed fluorescent protein indicating a synaptically connected neuron. Currently, the chimeric protein has been cloned and *in vitro* testing of the system has begun in HEK293T cells. This system will allow for simple and efficient transsynaptic labeling of neurons and probing of neural microcircuits.

Funding Source: Murchison Summer Research Fellowship, McNair Scholars Program, Trinity University Start-Up Funds, the Brain and Behavior Research Foundation NARSAD Young Investigator Award, Mary E. Groff Foundation, and the Women in STEM Program

Exploring Methodology on Plant and Fungal Endophyte Competition Studies

Susan Cleary*, **Grace Magavern**, **Coby Wellman***, **Jennifer Ha***, **Michael Haysley***, Kelly Lyons

Fungal endophytes live inside plants intercellularly and play important ecological roles in most plant communities. Among endophytes are the poorly characterized dark septate endophytes (DSE), a polyphyletic group of ascomycota fungi found in almost all vascular plants and nearly every ecosystem. Many play a broad range of symbiotic roles such as parasites, mutualists, and saprotrophs, and their ubiquity and wide variety of niches suggests that they may also play an important part in plant community dynamics. Because DSE are equally present in both native and invasive grasses, it is possible that they mediate competition between the two to some extent. In this study, we aim to characterize the role of DSE fungi in the competitive dynamics between native and exotic grass species of Central Texas grasslands. We also aim to identify DSE morphotypes and OTUs (operational taxonomic units) that might aid in native plant species establishment in a restoration context.

We will assess the competitive dynamics between the Texas native grass, *Bouteloa curtipendula* (sideoats grama), and the invasive grasses *Bothriocloa ischaemum* (King Ranch bluestem, KR) and *Dichanthium annulatum* (Kleberg bluestem) in varying species-to-species ratios inoculated with a variety of DSEs isolated from archived samples. Response variables will include plant above and below ground biomass, as well as the abundance and frequency of the DSE. To prepare for this study, we spent the summer conducting smaller experiments to refine our methods. First, we conducted several germination studies and determined that one week of cold, dry stratification followed by seed disinfection in 10% bleach might yield the highest percent germination in all three species. Additionally, we experimented with two growth mediums to bulk up our selected DSE morphotypes. The success of each medium was determined by the total amount of endophyte growth, measured from the dry biomass from each broth.

Funding Source: Biology Summer Undergraduate Research Fellowship (BSURF) and USDA, in collaboration with the National Center for Appropriate Technology.

Economic Incentives and Water Management in San Antonio

Izzy Clint*, Dr. Gregory Hazleton

Growing up in the state of Texas has instilled a constant awareness of the supply, quality, and necessity of the state's water resources in me. It seems like we are always under the whim of mother nature when summer brings water restrictions and any rain that falls is a blessing. More rain means more recreation, thriving vegetation, and fewer restrictions. While we see ourselves as dependent on the number of inches of rain received for a plentiful water supply, much of our resource relies on consistent water management.

San Antonio and the surrounding area acquires its drinking water from the Edward's Aquifer, which produces healthy drinking water and habitat for the creatures unique to this area. As San Antonio has grown, many problems have arisen due to the Aquifer's management, including development over the recharge zone, over pumping, and supplying quality infrastructure to deliver water or manage unwanted water. My project has surveyed these many difficulties because there isn't a "most important" threat facing our water resources, but an accumulation of multiple management issues caused by prioritizing economic growth. The decisions made today which favor the economic development of the city rather than the longevity of a plentiful aquifer will hurt us tomorrow. We must manage how water is used and how human development affects the quality of the water we desperately rely on. Many environmental protection groups are fighting against economic growth by preserving land, fighting for federal protections, and more. How the city makes policy in response to these two sides determines the longevity of this resource.

Funding source: Hixon Environmental Studies

Black Borderlands: The Costs of Slavery for Enslavers

Patrick Coan*, Dr. Van Hoy

When people think about slavery in Texas, they think about Juneteenth. Juneteenth refers to June 19, 1865 when Union forces arrived to occupy Texas and proclaimed emancipation. It recently became a national holiday. This shows the significance of slave history in Texas.

Early scholars have preferred to see Texas as a western rather than a southern state. This has led to the popular misconception that the institution of slavery was not important in Texas. Randolph Campbell changed the prevailing paradigm when he exposed the fact that slavery boomed in Texas and that it figured as the "Empire State of the South."

Drawing on digital sources such as the Municipal Archives for San Antonio and nondigital sources such as the Streeter collection, I focus on the price that Anglo Americans in Texas paid for slavery. The subtopics that I cover through my research are slavecatching, slave-jailing and slave advertising, city council ordinances that punished enslavers for their slave practices, the influence of the Knights of the Golden Circle, prevention of blacks from bearing arms, lynchings and killings of Unionists, tensions between the Anglo and German communities, and nonenslavers having to fight for the Confederacy which sought to preserve slavery. Only 13 counties in Texas had an enslaved population that outnumbered the white population, yet a leader of the Secession Convention, John A. Wharton of Brazoria County, steered all of Texas toward secession. Through my research, I hope that I can contribute to the dialogue about the history of slavery in Texas and San Antonio.

Funding Source: Summer Undergraduate Research Fellowship at St. Mary's University

Investigating the Autocleavage Activity and Stability of Spliceosomal Proteins Yeast Dib1 and Human Dim1

Anabelle Conde*, **Richard Dunn***, **Olivia Bowen***, Larisa Tinajero*, Dr. Corina Maeder

Pre-messenger RNA (pre-mRNA) splicing is the process in which introns, noncoding regions of DNA, are removed and exons, coding regions of DNA, are ligated to produce a mature mRNA transcript. This process is mediated by the spliceosome, a dynamic macromolecular complex composed of five small nuclear ribonucleoproteins and other proteins. At the center of the spliceosome is the evolutionarily conserved yeast protein, Dib1, composed of 143 amino acids essential for the splicing process and cell viability. Dib1 and its human ortholog, hDim1, have demonstrated peptidase activity, specifically autocleavage of the last thirteen and fourteen amino acids, respectively, of their carboxy-terminal tails. The mechanism and function of this autocleavage activity is highly uncharacterized. Therefore, we are interested in investigating this reaction and the importance of the tail region in pre-mRNA splicing. Autocleavage activity of human Dim1 was investigated through the purification of wild type hDim1 and autocleavage assays in the presence of various concentrations of $ZnCl_2$ or $CaCl_2$ and the presence or absence of EDTA, a chelating agent and peptidase inhibitor. To investigate the effects of the carboxy-terminal truncations on Dib1's stability, protein purification of wild type and truncated Dib1 mutants were performed. Denaturation circular dichroism spectroscopy employing increasing concentrations of guanidinium hydrochloride, a protein denaturant, was used to determine the stability of Dib1 and its truncated mutants. We will present our current progress and future directions.

Funding Source: Welch Foundation (W-1905-20190330 and W-0031); Flora Cameron Foundation

Reactivating Downtown, One Block at a Time

Henry Couch*, Dr. Jacob K. Tingle

This summer, I was a Community Economic Development Intern with Centro San Antonio. Centro is a nonprofit with the goal of making downtown San Antonio more beautiful, playful, welcoming, and prosperous. For our work on the Centro Economic Development team, another intern and I inventoried vacant retail space in the Public Improvement District, contacted the property managers to determine the space's availability, then created an extension of Centro's website that showed the availability of those properties. From there, prospective tenants could more easily explore downtown properties and connect with the retail space they are seeking.

Through this project, I experienced a completely new area of the city that I have been living in for 4 years for the first time. This internship showed me how the *sausage gets made* when it comes to development downtown, and it has reinvigorated my passion for urban planning and design. In my presentation, I will discuss how Centro's economic development team operates, my role, and my project of activating vacant retail space in downtown.

Funding Source: Arts, Letters, and Enterprise program

X-Ray Observations of Gravitationally Lensed Supermassive Black Holes

Elizabeth Coughlin*, Dr. David Pooley

A massive object creates a distortion in spacetime due to its gravitational field, and this distortion can function as a lens, bending light that passes near the object. If a distant, massive galaxy is between a background source of light and the observer, the light from the source may be gravitationally lensed to form multiple images. One incredibly useful source of light is a quasar, which is a supermassive black hole actively accreting material and emitting light across the electromagnetic spectrum. If the alignment between us, the lensing galaxy, and the background quasar is just right, four images of the quasar are formed around the lensing galaxy. Such quadruply-lensed quasars are rare, but they provide valuable insight into properties of both the black hole and the lensing galaxy. The data we have been working with this summer are observations of known quadruply-lensed quasars obtained by NASA's *Chandra X-ray Observatory*, the only satellite with fine enough spatial resolution to study each of the four images.

Most of the insight into the quasar and the lensing galaxy comes from comparing the brightness–or flux–ratios of the four images in the data and in the best model of the lensing galaxy. To determine these flux ratios, we perform two-dimensional image fits to the X-ray data. Our model consisted of four two-dimensional delta functions convolved with the point-spread function (PSF) of the telescope. The PSF describes how light from a point source is spread over a larger area on a detector. Observation-specific PSFs were created using specialized ray-tracing software provided by the *Chandra X-ray Center*. We spent considerable time exploring and optimizing parameter options for the software to produce PSFs that best matched the data; this analysis will provide the basis for all future analyses of these data.

Funding Source: Semmes Scholarship

Optimization of Photoinitiated Fluorogenic Polymerizations for Detection

Nadia Crawford*, Maggie Karim*, Dr. 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 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, a controlled photoinitiated reversible addition fragmentation chain transfer (RAFT) polymerization was developed and optimized with an enzymatic degassing technique, 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 was able to be run on a miniaturized scale to increase throughput. The results of the optimization strategies of both photoinitiated fluorogenic polymerization platforms to improve the efficiency, throughput, and fluorescence of the detection assay will be presented.

Funding Source: The Welch Foundation, The National Science Foundation

Fluorogenic RAFT Polymerization as a Detection Assay

Nadia Crawford*, Dr. Christina Cooley

To reliably detect low concentrations of analyte in solution, the analyte signal must be amplified. Polymerization reactions form long polymer chains from a single initiation event, which intrinsically amplifies the initiator signal. The Cooley Lab is developing a detection assay using fluorogenic polymerization, allowing for visible, real-time monitoring of the signal amplification. Reversible addition-fragmentation chain-transfer (RAFT) polymerization is a beneficial polymerization technique because it is controlled with living character, which allows for analyte concentration to track with expressed fluorescence. Additionally, it is sensitive to low concentrations of radicals and compatible with enzymatic degassing, permitting the development of open-air fluorogenic polymerization without oxygen interference. The development and optimization of this fluorogenic RAFT polymerization, as well as open-vessel miniaturization, will be discussed.

Funding Source: The Welch Foundation, The National Science Foundation

Mental Health Care for All: “One Youth and One Family at a Time”

Taylor Crow*, Dr. Jane Childers

During the summer of 2022, I was given the opportunity to intern in New Braunfels, Texas with Connections: Individual and Family Services. Connections is a nonprofit organization founded to help children and families struggling with mental health issues and with unsafe or inadequate housing situations. Connections has expanded throughout the years to service 17 counties across Texas, and their mission is “to strengthen communities, one youth and one family at a time”. I applied to be an intern with Connections through the Arts, Letters, and Enterprise internship program at Trinity University. Thanks to this opportunity, I have been able to contribute to the organization in many ways including auditing client files, shadowing counseling appointments with clients of all ages, researching new potential rates for the organization, helping in the process of applying for a grant, updating out of date paperwork, and traveling to various elementary schools across Comal county to assist one of Connections’ prevention specialists in teaching substance abuse curriculum.

Interning with Connections has taught me many valuable skills that I feel will help me going forward as I seek to become a clinical psychologist. Two of the biggest things I have learned are how to form a strong client-counselor relationship, and the importance of counselor self-care in order to avoid compassion fatigue while helping others. This internship showed me what being a counselor and helping at-risk youth is like on a day-to-day basis. This poster will share the details of the various tasks I was assigned to complete, along with the skills I developed over the course of my internship that allowed me to become a more efficient worker and that I will be able to use in the future in my own career as a counselor.

Funding Source: Arts, Letters, and Enterprise

Modeling Colloidal Surfaces using the Method of Regularized Stokeslets

Andrea Cruz*, Dr. Hoa Nguyen, Dr. Orrin Shindell

Bacterial motility can be hindered or enhanced by interactions with different types of surfaces in a fluid environment. To study bacterial motion near a rough surface, we simulate a layer of randomly-distributed microspheres to represent a surface constructed of lipids. Our goal is to incorporate physical realistic forces into our simulations to make quantitative predictions of fluid-surface interactions. Using the method regularized Stokeslets, we validated the Brownian motion of a particle due to thermal energy in the fluid environment. We further included the interparticle forces to examine how the viscosity of the microsphere layer changes as a function of its density. After calibrating our simulations with the experimental observations of an actual lipid surface, we will be able to couple our colloidal-surface model with the bacterial model to fully simulate their fluid-surface-bacterium interactions.

Funding Source: Murchison Summer Research Fellowship, NSF MRI-ACI-1531594

A Summer at Transplants for Children: Beyond the Medicine

Hannah Currie, Sarah Williammee* and Dr. Jacob Tingle

Both of us were fortunate to have been selected to intern for Transplants for Children this summer through the Arts, Letters, and Enterprise internship program. Since 1986, Transplants for Children (TFC) has served children who are waiting for or who have already received transplants and their families. Their focus is dedicated to serving those involved in the transplant journey including the mothers, fathers, siblings and, of course, the transplant recipient themselves. TFC focuses on the family through programs such as SibCamp and the STARS Scholar Program and frequently organizes events to bring various transplant families into contact with one another. Additionally, TFC is dedicated to offering families financial assistance during times of crisis, by paying for things such as groceries, transportation, and electricity. As TFC interns, we are primarily involved in strategic marketing, with the goal of increasing TFC's donor base and raising public awareness of the non-profit's mission. In this process, we have worked to obtain both new donors and sustaining members.

As a result of this internship, our professional skills have improved dramatically. Together, we have been conducting interviews with transplant recipients and their families in order to create an awareness campaign. Not only have these interviews allowed us to improve our communication skills with both children and adults, but they have also allowed us to improve our adaptability, social awareness, decision making and active listening. The interviews have been the highlight of our time at TFC, and have allowed us to see the hardship of the transplant journey as well as the resiliency these families possess to overcome such adversity. Once this internship is over, we will not only walk away with new and developed professional skills, but also with an understanding of the transplant journey and a new desire to help spread awareness for this community.

Funding Source: Arts, Letters, and Enterprise

Trace Element Mobilization and Attenuation in a Crude Oil Contaminated Aquifer

Audrey Davis*, Dr. Brady Ziegler

Trace elements including manganese (Mn), cobalt (Co), nickel (Ni), arsenic (As), strontium (Sr), and barium (Ba) pose numerous health complications when ingested in drinking water. Geogenic trace elements occur in aquifer sediment through both inclusion into mineral structures and by sorption to mineral surfaces. When geochemical conditions are disrupted by changing pH and redox conditions, minerals can become unstable, prompting trace element ions to mobilize from the sediment.

In a crude oil contaminated aquifer near Bemidji, MN, biodegradation of petroleum hydrocarbons has formed methanogenic and Fe-reducing redox zones and a lower groundwater pH. Within the petroleum hydrocarbon plume, co-occurring plumes of Sr, Ba, Co, and Ni have been identified and linked to mobilization from sediment near the oil source; trace element plumes are attenuated downgradient by sediment in the Fe-reducing zone. To elucidate the mineralogic origins of trace elements in sediment and identify the mechanism(s) attenuating trace metals in the Fe-reducing zone, this study uses scanning electron microscopy with energy dispersive X-ray spectroscopy (SEM-EDS). We hypothesize that ferrous carbonates precipitate due to groundwater supersaturation and attenuate dissolved divalent cations via solid solution formation and/or sorption.

Initial investigations of uncontaminated sediment show As and Mn frequently co-occur with Fe-hydroxides, while Sr has a strong association with feldspars. Co, Ni, and Ba co-occur with Fe and carbonates more frequently than silicates. In samples taken from the Fe-reducing zone of the hydrocarbon plume, As and Fe remain strongly correlated, as well as Sr and silicon (Si), while the attenuation mechanisms of Co, Ni, and Ba remain inconclusive. Results from these analyses may aid in designing procedures to reduce secondary pollution of groundwater following oil spills.

Funding Source: Minnesota Pollution Control Agency

Growing from the Ground Up: A Summer at Green Spaces Alliance

Sarah Davis*, Dr. Kelly Carlisle

This summer I had the privilege to complete an internship at Green Spaces Alliance of South Texas. This internship was sponsored by Trinity's Arts, Letters, and Enterprise program. My time at Green Spaces was geared towards developing a basic framework for the garden steward training series they were hoping to develop before I arrived. In this framework I have created a workshop formula sheet, a hub of resources for a wide variety of topics, and twelve workshops for Green Spaces to use in the garden steward training in the future. Also, as an extra project my boss tasked me to create and enact an event with one of the twenty-five community gardens in the Green Spaces network. To complete this, I partnered with Lakeview community garden to host a Watercolor in the Garden event for the kids in their neighborhood. The garden stewards there were feeling down about the lack of activity in their garden, so helping them create this event helped reinvigorate them to connect with their neighbors in a meaningful way.

My time at Green Spaces helped me reach my internship goals I set for the summer. The goals included learning the daily life of a nonprofit employee, further develop my hard and soft skills, and create meaningful connections with the employees and garden stewards in the network. I feel that I have achieved all these goals this summer as I developed my workshop framework and all the other tasks assigned to me daily.

Funding Source: Arts, Letters, and Enterprise

The Face and Voice of Gemini Ink: Marketing For a Nonprofit

Thảo Đinh*, Dr. Kelly Carlisle

Thanks to the Arts, Letters, and Enterprise program (ALE), I have the pleasure of working for Gemini Ink, San Antonio's writing arts center, as a full-time Marketing intern this summer of 2022. I was excited to find that my core values align with the mission of the organization: to teach the craft of writing to people of all levels so that they can bring their stories to life. I gained many learning experiences as I was multi-tasked between promoting various events, designing unique and eye-catching graphics, and proctoring in-person and virtual events.

I instantly became comfortable with the whole team behind Gemini Ink and slowly learned what made a nonprofit function. My days then were filled with a variety of tasks that helped enhance my skills, including: promotional writing, social media administration, event advertisement, event documentation, and event preparation and execution. I learned the most on the event dates. Though the events typically occurred outside of working hours, I enjoyed organizing and networking with talented writers, poets, and artists. Those were also the times when I learned the truth behind the phrase "teamwork makes the dream work." I feel fortunate to receive so much care and support from Gemini Ink staff and their partners, and especially my supervisor Dr. Carlisle. Reflecting on the experience, I realize I helped people discover their inner voice which made every hour of work meaningful and enjoyable. I hope to continue this kind of work in the future.

Funding Source: Arts, Letters, and Enterprise

Investigating a Potential Link Between the Lipid Phosphatase Fig4 and MAP Kinase Pathways in Neurodegenerative Diseases

Lauren Dotson*, Bonnie Lloyd, Imran Khan, Hannah Reeves, Harrison Hall, Ashlee Ochoa and Dr. Bethany Strunk

Fig4 is a lipid phosphatase which is responsible for keeping normal cycles of phosphorylation and dephosphorylation occurring in its lipid substrate PI(3,5)P2 in eukaryotes from yeast to humans. Fig4 is known to perform this critical cellular function through interaction with the Vac14-Fab1-Fig4 protein complex. Mutations in Fig4 that cause dissociation from the Vac14-Fab1-Fig4 protein complex lead to abnormal cycles of phosphorylation/dephosphorylation and thus dysregulation of PI(3,5)P2. Importantly, these mutations have been implicated in neurodegenerative diseases in humans including CMT4J and ALS. Strikingly, the expression of corresponding Fig4 mutants in yeast cells leads to a growth advantage on rapamycin at 37oC compared to expression of wild type, or no Fig4. We propose that when Fig4 is dissociated from Fab1 and Vac14, it is available to interact with an unknown pathway to promote growth under these conditions. We found that the Mitogen-activated protein kinase activator Ste20 was required for this Fig4 dependent growth advantage. We are therefore investigating if Ste20 directly mediates this growth advantage. We have found that overexpression of Ste20 enhances the Fig4 dependent growth advantage supporting a direct role for Ste20 mediating this phenotype. It is known that Ste20 is primed to phosphorylate a subset of MAP kinase pathways through direct interaction with the small GTPase CDC42. To narrow down the potential pathways through which Ste20 may be promoting the Fig4-dependent growth advantage on rapamycin, we generated Ste20 mutants that disrupt Ste20 catalytic function or its association with CDC42. We have found that Ste20's catalytic function is required for the Fig4 dependent growth advantage; however, its association with CDC42 is not. We are continuing to investigate potential direct interactions of Fig4 and Ste20 to gain insight into how these proteins cooperate to mediate cellular homeostasis with potential implications for understanding human disease.

Funding Source: Voelcker Foundation, Flora Cameron Foundation

Amino Terminal Truncations Of The Protein Dib1

Jessica DuVon*, Marina Vargas, Dr. Corina Maeder

\The spliceosome is a multi-megadalton ribonucleoprotein complex responsible for catalyzing the transition of pre-messenger RNA (pre-mRNA) into mature messenger RNA (mRNA). During the process of splicing, non-coding regions of RNA (introns) are excised, and coding regions of RNA (exons) are ligated together. The spliceosome is a dynamic complex comprising multiple assemblies that each serve a purpose in the splicing cycle. Aberrant splicing has played a crucial role in the development of craniofacial disorders, retinitis pigmentosa, cancers, and a large range of diseases. If the function of Dib1 and other spliceosomal proteins were better understood, therapeutics could be designed to prevent abnormal splicing. As part of the assembly cycle, departure of the spliceosomal protein Dib1 allows the spliceosome to become catalytically active. Since Dib1 is important to the formation of the spliceosome, the goal of my project is to understand the importance of its structure on splicing. In particular, my project seeks to show how the amino terminus of the Dib1 protein affects its function. We have constructed deletions of the amino terminus of Dib1 and incorporated these mutations as the sole copy of *dib1* in yeast cells. We are currently analyzing their effects on growth through growth assays.

Funding Source: Trinity University Chemistry Department, The Welch Foundation

Identifying Novel Neurodegenerative Disease Related Pathways of Lipid Phosphatase Fig4

Sophia Ebel*, Roxana Castor*, **Imran Khan**, and Dr. Bethany Strunk

Fig4 is a PI Phosphatase conserved in eukaryotes from yeast to humans. Mutations in Fig4 have been implicated in human neurodegenerative diseases. Fig4 is known to control the signaling lipid PI3,5P2 through direct association with the Fab1-Vac14-Fig4 complex. PI3,5P2 levels change in response to both internal and external cellular conditions which regulate many critical cellular processes including endo-lysosomal trafficking, ion channel gating, and TORC1 function. Fig4 mutations are assumed to cause neurodegenerative diseases through altered regulation of PI3,5P2. However, we have recently found that Fig4 mutants related to neurodegenerative diseases that lead to impaired association of Fig4 with Fab1 and Vac14 promote a rapamycin-associated growth advantage at 37 ℃. This growth advantage is conferred independent of Vac14 and independent of Fig4 catalytic function. We hypothesized that Fig4 may promote this growth advantage through association with an unrecognized cellular pathway and have identified the MAP kinase pathway activator Ste20 as being required. In addition, we have found excess wildtype Fig4 can also confer this growth advantage suggesting this may be a context inappropriate display of a normal Fig4 function. To better understand this novel Fig4 function, we set out to identify conditions in which these Fig4 mutants alter yeast phenotypes in the absence of rapamycin. Rapamycin inhibits TORC1 to control the switch from anabolic to catabolic metabolism. We therefore investigated the influence of disease related Fig4 mutants on several pathways related to TORC1 and Ste20. Our preliminary data indicates that Fig4 disease related mutants bypass Ste20-dependent glucose-induced cell death. We are verifying these results. These findings may lead to insights into PI3,5P2 independent contributions of Fig4 to human diseases including ALS and CMT4J. This will be critical for finding treatments for these currently incurable diseases.

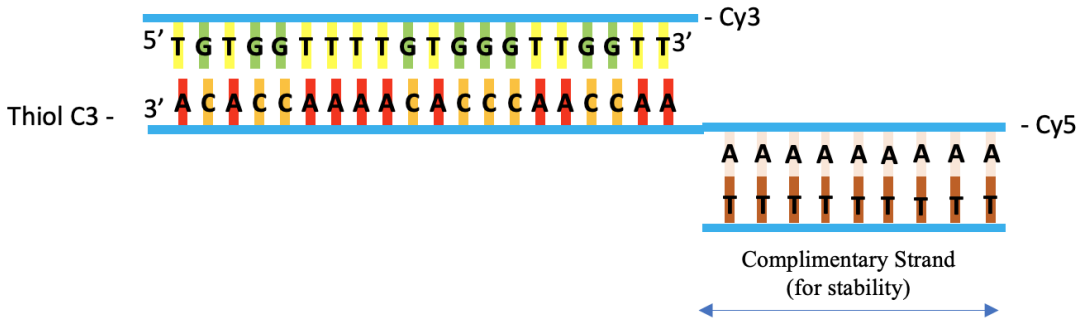
Funding Source: Voelcker Foundation

Using DNA to Precisely Position Fluorescent Molecules Above a Nano Patterned Gold Substrate Which Supports Surface Plasmons

Evan Engelhaupt,* Andra Key, Dr. Jennifer Steele

Our lab seeks to characterize the enhancement of the Förster resonance energy transfer (FRET) efficiency using surface plasmons excited on gold nanogratings. Surface plasmons are longitudinal oscillations of conduction electrons that travel parallel to the boundary between metal and dielectric surfaces. FRET is the transfer of energy between a donor fluorescent molecule and an acceptor fluorescent molecule. FRET can be used in the analysis of biochemical reactions. The efficiency of the energy transfer to the acceptor is strongly dependent on the distance between the donor and acceptor molecules. Additionally, we suspect the surface plasmon enhancement effectiveness depends on the distance between the donor and acceptor and the grating surface. To precisely position the donor and acceptor molecules relative to each other and the gold nanograting, we developed a protocol to use DNA as scaffolding.

We purchased two complimentary, single strands of DNA that were 20 base pairs (bp) in length. Each single strand was terminated with either a thiol group or a fluorescent molecule, resulting in a double stranded helix with the thiol group and fluorescent molecule on opposite ends. We developed a protocol to attach the thiol end to either a gold nanograting or a glass substrate. Once we verified the protocol, our first experiment will be to focus on the relative spacing of the donor and acceptor molecule. To do this, we will add adenine bp extensions of varying lengths to the thiolated single strand, as shown below. On the end of this new strand will be our acceptor molecule. We will vary the distance between the donor and acceptor molecules by changing the length of the adenine bp extension.



Funding Source: This material is based upon work supported by the National Science Foundation under Grant No. 2004681

Induction of Differentiation of HT22 Cells via Removal of Sera and Addition of Pro-Neural Factors

Evan Farrell*, Alice Dang*, John Clark, Madison Horn, Liliana Quiroga, Jullian Valadez, Cole Williams, and Dr. Gerard M. J. Beaudoin, III

HT22 cells are derived from mouse hippocampal neurons that are easily cultured as they are immortalized. In contrast, differentiated neurons cannot be cultured past primary culture because they do not readily divide once differentiated from precursor cells. This makes in vitro studies using primary neurons more difficult as fresh neuron samples must be obtained for every experiment. We found that HT22 cells do not efficiently express plasmids with neuron specific promoters. Since neurons efficiently express these plasmids, the low expression in undifferentiated HT22 cells suggests they are an inaccurate neuronal model for in vitro experiments. To remedy this, we have manipulated the media used for growing HT22 cells to induce a more differentiated state using a neural basal media along with additional supplements.

After differentiation, it is necessary to perform experiments to determine how well the protocol has improved the neuronal characteristics of the HT22 cells. Previous experiments have shown cell cycle arrest occurs in HT22 cells after treatment. HT22 cells do not normally undergo apoptosis, however, after differentiation they may undergo apoptosis. To test this, we stained the post differentiation cells using AnnexinV and PI (Propidium Iodide), and performed flow cytometry to determine what portion of the cells are apoptotic or necrotic. Apoptotic cells have been targeted for loss whereas necrotic cells are dying due to insufficient support. The next experiment aimed to characterize differentiation using an AAV5 viral vector to express fluorescent proteins in positively transduced cells. The target receptor for AAV5, PDGFR, is highly expressed in neurons but less so in HT22 cells. Post treatment, HT22 cells were transduced with AAV5. Through confocal imaging, the transduction efficiency could be determined. Higher transduction efficiency indicates more neuronal differentiation due to increased PDGFR expression. Through these assays, we hope to determine the effectiveness of our differentiation protocol.

Funding Source: Murchison Summer Research Fellowship, McNair Scholars Program, Biology Summer Research Fellowship, Trinity University Start-Up Funds, The Brain and Behavior Research Foundation NARSAD Young Investigator Award, and the Mary E. Groff Foundation

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Comparative Studies on the Physiology and Motility of the Flagellate Bacteria *Escherichia coli and Pseudomonas aeruginosa*

Nicola Ferguson*, Mahika Desai*, Dr. Frank Healy

Many organisms have adaptations allowing them to navigate through their surroundings. *Escherichia coli* and *Pseudomonas aeruginosa* are unicellular bacteria that utilize flagella to swim through different fluid environments. Each flagellum is powered by a motor capable of switching direction, allowing bacteria to swim toward attractants or away from repellents through chemotaxis. These motors spin because of torque provided by stators, transmembrane complexes that convert the movement of ions across the cell membrane into rotation. Although *E. coli* has peritrichous flagella and *P. aeruginosa* has a single polar flagellum, motor and stator structures are conserved among them as well as other bacteria with diverse morphologies. In order to explore the contributions of stator structure to swimming dynamics of morphologically diverse bacteria, we are developing techniques to analyze swimming behaviors in different fluid environments. Strains of *E. coli* and *P. aeruginosa* were cultured aerobically in L broth and motility media, and their absorbances were recorded periodically to measure growth rates. Cell numbers were also measured for mid-exponential phase cultures. Videos of bacterial swimming in motility media and saline buffer containing different concentrations of carboxymethylcellulose were captured and analyzed using ImageJ. Swimming behavior was also characterized using soft agar media. In general, wild-type *P. aeruginosa* strains exhibited faster swimming in liquid cultures, while wild-type *E. coli* strains exhibited faster radial expansion rates in soft agar. Strains of *P. aeruginosa* were grown in different concentrations of ampicillin, kanamycin, and spectinomycin to determine their sensitivity to each antibiotic. In the future, we plan to create strains of *P. aeruginosa* and *E. coli* expressing mutant and alternate stators, and compare their swimming behaviors to that of wild-type strains. In this way we hope to broaden our understanding of structural features of stators and their contributions to bacterial swimming dynamics.

Funding Source: Murchison Fellowship, Biology Summer Undergraduate Research Fellowship

Working to End Domestic Violence in San Antonio

Alondra Flores*, Dr. Carlos Vélez Salas

I was granted the opportunity of interning with the P.E.A.C.E. (Putting An End to Abuse through Community Efforts) Initiative this summer. The P.E.A.C.E. Initiative is a non-profit organization aiming to educate the San Antonio community about domestic violence and its ramifications. After applying through the M.A.S. (Mexico, the Americas, & Spain) program at Trinity University, I was fortunate to be selected as an intern for the P.E.A.C.E. Initiative. The M.A.S. program encourages students to incorporate their Hispanic culture and bilingualism daily. Growing up in a Hispanic household unveiled some destructive family dynamics due to misconceptions about healthy relationships. My personal experience helped me empathize with the adversities domestic violence survivors faced.

Working with the P.E.A.C.E. Initiative, I attended multiple rallies, parades, and protests advocating for awareness of various social justice issues. While interning, I witnessed the lack of social cognition in the community, including my own. As a result, I became more mindful of the political issues dividing our community, like gun reform and the overturning of Roe v. Wade. As an adolescent, I was previously uninformed about anything beyond the scope of my academic education. This internship expanded my horizons by developing my recognition of my role as an upstanding citizen. I discovered the importance of exercising our right to vote and using our voices.

I noticed that organizations had limited resources that aided with reaching out to the community and educating them about the help that was accessible. Therefore, I collaborated with my advisor at the P.E.A.C.E. Initiative to brainstorm ideas on how organizations can rely on their alliances within the community to inform the public of the help available.

Funding Source: M.A.S. Program Internship

Food Insecurity In Our Community

Zoe Flores*, Dr. Alfred Montoya

This summer I was given the opportunity to intern with CrowdSource Rescue (CSR.) CSR is a relatively new nonprofit organization established in response to Hurricane Harvey in 2017. CSR's mission is to utilize technology to connect professional and volunteer first responders with response cases during and after natural disasters. However, as COVID-19 was categorized as a global pandemic, the organization co-opted the rescue platform to assist people affected by the pandemic. They partnered with Texas food banks to organize volunteers and help do no-contact food deliveries to elderly residents experiencing food insecurity.

I have previously volunteered with CrowdSource as a food delivery driver. My volunteer work helped address the food insecurity experienced in my community as a result of COVID-19. Responsibilities as an intern with CrowdSource include: working directly with clients to address their needs and recommend resources, providing homelessness resources and information, doing wellness checks, researching grants and funding, completing volunteer outreach, and leading data cleansing of response cases.

While interning, I learned how a nonprofit operates and overcomes challenges related to funding, limited resources, volunteer recruitment, and retention. At the beginning of the internship, my job focused on food delivery and data cleansing. This allowed me to expand my knowledge on google sheets and other data apps. Food deliveries enabled me to work directly with clients to ensure continuous food deliveries. I also implemented volunteer outreach ideas. These included the creation of informational flyers for distribution to high school organizations. I was also able to further my Spanish speaking skills while working with the clients. Grant research is another area of focus to secure funding opportunities for CSR to continue to serve clients. One of the most impactful results of my internship was helping a client find resources for securing housing and searching for employment. I researched different shelters in the community and assisted in the enrollment process for the client. He now has the support to find employment and overcome his displacement situation.

Funding Source: Mexico, the Americas, and Spain (MAS) Program

Pre Recorded Presentation

Behind the Scenes: How Does a Nonprofit Draw Visitors In and Engage Their Audience?

Sarah Fridakis*, Dr. Jacob K. Tingle

This summer I had the amazing opportunity to intern with the San Antonio Parks Foundation (SAPF). While the title was a Communications and Marketing Intern, I gained experience and skills in many other areas as well. SAPF's mission is to enhance and improve parks through fundraising, conservation efforts, and promoting events to spread awareness and knowledge about parks in the city of San Antonio and Bexar County. I worked under the director of communications, Libby Day, who was a great mentor and leader. My goals for this summer were to learn how to use Adobe applications such as Illustrator and Photoshop, communicate in a mature and effective way, think creatively and innovatively, grow engagement in the social platforms we were using, and adapt to changing situations or problems I faced. Over the course of the summer, I feel like I achieved my goals and more. During the presentation I will discuss specific activities and projects that helped me achieve my goals. I will also discuss how the internship impacted my career exploration.

Funding Source: Arts, Letters, and Enterprise

Conservation: How Preserving our Lands Preserves us

Jordan Frederick*, Dr. James Shinkle

This summer I spent my time as a monitoring intern with The Nature Conservancy's Texas chapter through the Arts, Letters, and Enterprise program. The Nature Conservancy is a nonprofit which works to create a world where people and nature can thrive by conserving the lands and waters on which all life depends. TNC takes a perspective which considers not only nature and its needs, but the needs of the people that rely on it. As an intern, I tackled a range of tasks, such as inserting monitoring data into corresponding spreadsheets, working in the field, creating and updating preserve summaries, carrying out a data analysis project, and building what TNC calls a 'Story Map' on the functionality of oyster reefs with two of the other interns. My individual data analysis project considers the change in bird species prevalence over a 10 year period with respect to temperature changes, and cites the effect that climate change has on biodiversity.

Working through these assignments and projects showed me how enmeshed we are into nature; that one is not itself without the other. My time spent on the oyster reef Story Map further established this thought as oysters benefit us in more ways than one, supporting us economically and environmentally. TNC aims to find a balance between human benefit and environmental benefit for species such as oysters, but in some species the human and environmental benefits align. Prescribed fire has been used for decades to increase biodiversity, which in turn increases carbon sequestration. This measure effectively benefits humans and the environment, but is a process which must be tightly regulated; that's when TNC steps in. My presentation will dive further into these two topics, ultimately showcasing the ways in which we can benefit ourselves and our environment in one fell swoop.

Funding source: Arts, Letters, and Enterprise Program

Recording and Predicting Freezing of Gait Events in Parkinson's Disease Patients with a Smartwatch

Jackson Froehlich*, Dr. Britton Horn

Parkinson’s Disease (PD) affects over 10 million people worldwide, with 60,000 new diagnoses of PD in the U.S. each year. Some PD patients suffer from a condition called Freezing of Gait (FoG), which inhibits the patient's movements, and can even lead to falls and severe injury. Automatic intervention through rhythmic or auditory cues can help restore a normal gait pattern to the patient. Current automatic intervention techniques typically use proprietary hardware, require invasive placement of sensors or other bulky equipment, and may be prohibitively expensive. A Smartwatch has none of these drawbacks, as it is small, non-invasive, and may already be worn by patients. This research works to both record and detect FoG events using a custom-made WatchOS application. The watch app captures FoG events in real time along with a paired phone app, which a clinician uses to record the FoG events. An artificial neural network trained on this data shows generally high sensitivity and specificity to FoG events, although certain walking aids remain a challenge for FoG detection. This research demonstrates the viability of existing smartwatches as a vehicle for FoG detection and intervention.

Funding Source: Advisor Startup funds

The Effects of Different Amyloid Beta (Aβ)-based Species on the Human Microglia-mediated Inflammatory Response in 3D Multicomponent Interpenetrating Polymer Networks (mIPNs)

Noah C. Fulcomer*, Andrea C. Jimenez-Vergara Ph.D., Dany J. Munoz-Pinto Ph.D.

Alzheimer's disease (AD) is a debilitating neurological disorder that affects roughly 5.1 million people over the age of 65 worldwide. This number is expected to reach 20 million by 2050, making research in this area especially imperative. Senile plaques of amyloid beta (Aβ) peptides have long been identified as a major biological marker of the neurodegeneration seen in AD. These Aβ aggregates activate pro-inflammatory responses in microglia, leading to a vicious cycle of further plaque accumulation and neuroinflammation. Recent literature has identified specific roles of the Aβ peptide fragments $A\beta_{1-28}$, $A\beta_{17-40}$, and $A\beta_{25-35}$ in this neuroinflammatory response. However, the majority of these studies have employed 2D *in vitro* models, meaning results cannot be directly extrapolated to 3D *in vivo* conditions. Therefore, to investigate the specific effects of $A\beta_{1-28}$, $A\beta_{17-40}$, $A\beta_{25-35}$, and senile plaques, the current study employed an innovative 3D approach by treating primary human microglia with Aβ-based species immobilized on multicomponent interpenetrating polymer networks (mIPNs). The mIPNs employed in this study contained collagen type I (Col-I) and hyaluronic acid, essential extracellular components of the central nervous system, along with the biocompatible and "blank slate" molecule poly(ethylene glycol) diacrylate (PEGDA). The Aβ species were tethered to Col-I molecules within the mIPNs via linkage with *N*-acryloxysuccinimide. ATR-FTIR spectroscopy confirmed this bioconjugation of Col-I and Aβ species. Incorporation of Aβ species into the 3D network in the presence of human microglia was confirmed by immunofluorescence using confocal laser microscopy. The cellular response of microglia to different Aβ species using mIPNs will be evaluated in terms of their inflammatory response and cell receptor activity at the gene and protein expression levels. Differential responses are expected of different Aβ species, which would provide an essential contribution to the understanding of the neurodegenerative potential of Aβ peptides within a generalizable cell milieu.

Funding Source: Alzheimer's Association and Alzheimer's Texas (AARGD-17-531470), Murchison Research Fellowships

Understanding the Effect of Retinitis Pigmentosa on RNA Splicing

Malcolm Gavigan*, Caroline Myers*, Marina Vargas, Ashna Wagle, Dr. Jonathan King, Dr. Corina Maeder

Retinitis pigmentosa (RP) is a degenerative eye disease that causes night blindness, tunnel vision and eventually complete blindness. Autosomal Dominant Retinitis Pigmentosa (adRP) has been linked to mutations in various proteins in the spliceosome, a large complex of RNA and protein that serves to facilitate removal of the introns and ligation of exons in pre-messenger RNA to form mature RNA, which can then be used to synthesize protein. Among the proteins with mutations found in patients with adRP are PRPF6 and PRPF31. These two proteins are found in the U4/U6-U5 triple-snRNP, a group of small nuclear ribonucleoprotein complexes. The triple-snRNP is essential for creating the catalytic version of the spliceosome. It is hypothesized that these mutations could hinder the function of the spliceosome and cause photoreceptor cell degeneration by limiting the available necessary spliced mRNA to make critical proteins. To better understand the effect of these mutations and the mechanisms of the spliceosome, we are using a mouse photoreceptor cell (661W) to study splicing. In the cell line, we are utilizing growth assays, splicing assays, immunofluorescence, and western blot analysis to analyze mutations in PRPF6 and PRPF31 and will present our current findings.

Funding Sources: Max and Minnie Tomerlin Voelcker Foundation, Welch Foundation

Synthesis of Second-Generation Disease Targeted ROS Activated Prodrugs

Noah Gilbertson*, Elizabeth Batchinsky*, Dr. Christina Cooley

AA147 is a small molecule activator of the AFT6 branch of the Unfolded Protein Response (UPR), a biological pathway that mitigates the misfolding of proteins and upregulates 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. The Cooley lab works to develop various prodrugs, versions of AA147 that are caged and biologically inactive until encountering diseased tissue, thus preventing excessive activation of the UPR. The diseased tissue of interest is heart tissue following an ischemia-reperfusion event, such as a heart attack. UPR activation mitigates damage to heart tissue by preventing protein misfolding and scavenging ROS. Using the presence of ROS as our disease indicator, the Cooley Lab synthesized a prodrug that would release AA147 in damaging concentrations of hydrogen peroxide, a type of ROS. The prodrug was found to be kinetically slow, with a rate-limiting step slowing the release of AA147 (the biologically active component of the drug). To increase the protection of heart tissue, we are synthesizing and testing three new prodrugs that would theoretically provide for quicker release kinetics. The first of these prodrugs was a variant of the original prodrug that would produce a more substituted alkene as a byproduct of the rate-limiting step, theoretically speeding up the release of AA147. The second prodrug took a different approach and would entirely remove the rate-limiting step with a more direct cage. The third prodrug is another variant of the original prodrug that employs a carbonate between AA147 and the previous cage linker system that would allow for the release of CO2, an entropically favorable process, which would speed up the release of AA147. Through these prodrug options, the Cooley lab aims to create a prodrug that balances quick release with stability.

Funding Sources: The Welch and Beckman Foundations

Modulating the Differentiation of Human Neural Stem Cells In 3D Contexts by Varying Hyaluronic Acid Chain Length

Anna Gonzalez*, Meagan McKee, Andrea C. Jimenez-Vergara Ph.D., Dany Munoz-Pinto Ph.D.

Nearly one billion people around the world suffer from one of many neurological disorders such as Alzheimer's Disease (AD), Parkinson's Disease (PD), migraines, and others. The use of induced pluripotent stem cells has facilitated the *in vitro* study of neurological disorders through the controlled differentiation of these cells into neural stem cells (iHNSCs). These cells can be further differentiated into astrocytes, oligodendrocytes, and neurons. Most *in vitro* models have been traditionally developed using 2D microenvironments such as coated or uncoated plastic or glass surfaces. These surfaces exhibit rigidity values orders of magnitude higher than central nervous system (CNS) tissue and are not representative of the natural milieu for these cells. In addition, CNS cells experience a 3D environment which cannot be provided by culture surfaces. In this work, we aimed to design, fabricate, and evaluate microenvironments to support the *in vitro* culture of iHNSCs in 3D contexts and regulate their differentiation potential. Towards this end, we used multi-interpenetrating polymer networks (mIPNs) as our scaffolds. The effects of hyaluronic acid molecular weight and culture conditions on the differentiation of iHNSCs were evaluated.

In this study we used iHNSCs as the cell source. The cells were expanded according to the provider's protocol using growth media supplemented with B27, basic fibroblast growth factor (bFGF), endothelial growth factor (EGF) and heparin. The mIPNs were composed of varying levels of hyaluronic acid (HA) high and low molecular weight (HA-HMW and HA-LMW), collagen type I (col I), and poly(ethylene glycol) diacrylate (PEGDA). The cells were collected and encapsulated based on a procedure previously developed by our laboratory, then cultured at 37°C and 5.0% CO_2 for 14 days in different differentiation media. The differentiation of the iHNSCs was evaluated using quantitative reverse transcription polymerase chain reaction (qRT-PCR) targeting for differentiation markers for astrocytes, oligodendrocytes, and neurons.

Funding Source: This work was supported by a grant from the Alzheimer's Association and Alzheimer's Texas (AARGD-17-531470), the McNair Program, and the Murchison Fellowship

Cocaine Diminishes Fear Conditioning Acquisition in Female Rats

Daniela Gonzalez*, Dr. Kah-Chung Leong

Cocaine is a psychostimulant drug consumed widely in the United States. In addition to cocaine's addictive properties, cocaine abuse can lead to individuals partaking in potentially threatening situations, disregarding the danger that these pose and leading to potentially fatal consequences. One possible reason for this is cocaine's negative effect on memory formation, particularly aversive memories. The purpose of the present study was to investigate the effects of cocaine on Pavlovian cued fear conditioning. Specifically, we examined cocaine's effects on both the acquisition and consolidation of fear memories using a tone-shock fear conditioning paradigm. On day 1, animals were conditioned with six tone-shock pairings. On day 2 (24 hours later), animals were returned to the fear chamber and tested for recall of fear memory. This consisted of the presentation of a single tone without a shock to determine fear behavior. Fear was measured as percent time the animal spent freezing during the tone. In Experiment 1, cocaine (15mg/kg) was administered via I.P. injection to female Sprague-Dawley rats 15 minutes prior to the conditioning trials to assess the effect of cocaine on fear acquisition. In Experiment 2, cocaine (15mg/kg) was administered immediately after the conditioning trials to measure the effect of cocaine on memory consolidation. No cocaine was administered on test day. Results from experiment 1 showed that cocaine administration prior to conditioning diminishes fear acquisition during the conditioning trial and results in reduced freezing during the fear test. In Experiment 2, cocaine administration after conditioning continued to reduce freezing during the fear test. These results highlight the detrimental effects of cocaine on the formation of fear memories, providing an explanation as to why cocaine users often engage in risky and dangerous behaviors. Furthermore, these results have important overarching implications for the understanding of substance use disorder and memory.

Funding Source: McNair Scholars Program

Understanding Youth Scholar Experiences in a Educational Pathways Project

Araceli Gonzalez*, Dr. Enrique Alemán Jr.

My research focuses on an ongoing youth participatory action research (YPAR) project named the Trinity Youth Scholars Program (TYS). TYS is a college preparatory partnership created by Trinity University faculty and four classroom teachers in San Antonio Independent School District (SAISD) and Harlandale Independent School District (HISD). The partnership provides opportunities for the mostly-Latina/o/x youth to be mentored and to engage in research as a strategy for helping them along the way to college. Applying a YPAR framework, the partnership centers youth voices on issues that impact their lives or communities. Youth engage in research on social justice issues as part of the afterschool space that is co-created with their teachers and Trinity team. Throughout the semester, I have attended TYS sessions at the school sites and shared my experiences as a Trinity student. Given my initial work with TYS and its youth scholars, this summer I conducted Spanish and English interviews with the youth participants to document and describe their experiences during the first year of the program. Understanding how their academic goals have shifted and what role that mentoring played in their experience are also purposes of this research. This program has given me the opportunity to mentor students and to share my educational journey as a first-generation Latina student.

Funding Source: McNair Scholars Program

Poster Session Presentation 13

Understanding Protein-Induced Membrane Damage of hIAPP in Lipid Nanodomains using Multiscale Modeling and Simulations

Angela Graf*, **Aakriti Acharya**, **Thuong Pham**, **Amber Lewis**, Dr. Kwan K. Cheng

Human Islet Amyloid Polypeptide (hIAPP, amylin) is a 37-residue, intrinsically disordered protein (IDP) whose amyloidogenic aggregation has been strongly linked to the pathogenesis of type 2 diabetes. Amylin is cosecreted with insulin during the time of glucose uptake, but similarly to other amyloidogenic IDPs, such as the human tau protein or β-amyloid, amylin has a propensity to self-aggregate into toxic fibrils that can disrupt cell functions and progress type 2 diabetes. Despite modern advances in Cryo-EM and NMR, IDPs like hIAPP are notoriously difficult to study due to their structural heterogeneity; however, taking advantage of computational molecular dynamics (MD) allows us to generate realistic, structural ensembles that can interpret and even predict experimental results identified by Cryo-EM and NMR. Our simulations involve the self-aggregation of hIAPP in solution as well as onto cholesterol-enriched lipid nanorafts (both neutral and negatively charged), which function as mimics of the cell membrane. In MD simulations, coarse-grained (CG) models are often preferred to atomistic models because they decrease the computational requirements of an atomistic system by reducing its degrees of freedom. We use CGMD to perform efficient, long-time simulations on our hIAPP-membrane system on the order of microseconds to study aggregation and membrane-binding events. After our initial CG simulations, we reverse-map our system to retrieve atomistic detail on the order of nanoseconds. Using multiscale MD simulations, we can explore and analyze the binding kinetics, energetics, and preferences of hIAPP as it self-aggregates onto the cell membrane.

Funding Source: NSF, Welch Foundation

Multi-Dimensional Interpretable Interaction Network (MDiiN)

Garrett Greiner*, **Logan Martinez**, Dr. Yu Zhang

We introduce a model that is able to predict individual aging trajectories of health and survival. Aging is a high-dimensional process due to the enormous number of aspects of healthy functioning that can change with age across a multitude of physical scales. In addition, the stochastic nature of aging adds another layer of complexity when it comes to modeling aging. Our model, the Multi Dimensional Interpretable Interaction Network (MDiiN), uses a multi dimensional interaction network, neural networks, and stochastic differential equations (SDEs), to accurately predict the trajectories of the various health variables that we consider in this study. We include the three dimensional interaction network in order to be able to interpret our results, as this network captures the strength of connections between the health variables. We use the English Longitudinal Study of Aging (ELSA) dataset to train and test our model. Since longitudinal datasets are often plagued with missing data, we use a Variational Autoencoder (VAE) to impute missing data and to generate synthetic data. We have found that MDiiN performs better than some other models that predict health outcomes and survival. We also compare MDiiN to lower dimensional latent space models to illustrate the dimensionality needed to make accurate predictions of these aging trajectories.

Funding Source: Computer Science HEP Fund

What is a Socially Conscious Consulting Firm?

Grace Goerig*, Isabel Grimsinger*, and Sidney Strickland*, Dr. Ruben Dupertuis

The three of us were fortunate enough to spend the summer interning at Burnam | Gray, a B-corp certified, socially conscious consulting firm located in San Antonio with non profit clients. Burnam | Gray strives to support a variety of non-profit organizations through communication and marketing services, data management, fundraising including grant-writing, and strategic assessments. They have a variety of nonprofit clients in San Antonio and south Texas, including City Education Partners, Jewish Family Services, and the Musicians of San Antonio.

Throughout the summer, we took on a variety of projects and plan on highlighting the most impactful for each of us during the presentation. Isabel was able to practice her technical writing and data management skills through her work on a Standard Operating Procedure manual, and the collection of information for PlanYourVoteSA. Sidney assisted in fundraising for CEP and MOSAS utilizing a grant-management software, fluxx.io, drafting LOIs and grants for the organizations in the process. Grace worked primarily on social media posts and communication for JFS and participated in the listening and research phase for Team Mario.

Trinity University Arts, Letters, and Enterprise and Stinner Fellowship

A Practical Recipe on How to Gerrymander

M. Kent Hamatani*, Dr. 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. We wanted to know if a map could be gerrymandered along party lines to give the maximum advantage to the minority party. We designed an algorithm to cluster minority voters into communities of interest with enough votes to win their district. Then, we distributed the majority votes using techniques known as “packing and cracking” to find a valid redistricting plan. We discovered that the more one group clusters together, the easier it is to increase their political sway. Our main contribution is to develop a technique to take in the locations of minority votes in a state and output the desired number of communities of interest to win an election. This project focuses on partisan gerrymandering and does not address issues of race, gender, income, and other factors that are better suited to be answered by other researchers in the future. However, our research does lay the groundwork to help answer such questions moving forward.

Funding Source: McNair Scholars

“All They Ever Were Was Themselves”: American Climate Fiction and the Privileged Escape

Harrison Hartman*, Dr. Gregory Hazleton

As environmental devastation continues to challenge the place for humans on the planet, literary critics have challenged the capacity and value of fiction in imagining a climate-changed world. Where most ecocritics focus on the representational success and failure of American climate fiction to depict the disproportionate effects climate change will have on poor marginalized communities, I focus on the representation of the economically privileged in the genre. In particular, I argue for the successful representation of imaginative failure in novels about and from the perspective of the wealthy. Where critics have argued that apocalyptic narratives mostly ignore the role climate change plays in exacerbating inequality and prompt feelings of climate fatalism, I evaluate the resonance of climate change and its challenge to wealth in the narrative of privileged escape. Through an analysis of Lydia Millet’s *A Children’s Bible*, and aided by classic escape narrative fictions, including Cormac McCarthy’s *The Road* and Octavia Butler’s *Parable of the Sower*, I argue for the significance of realist climate fiction of the wealthy in the climate fiction genre.

Funding Source: Mellon Initiative

The Importance of Sexual Health Education in Texas

Sophia Hedley*, Dr. John Hermann

This summer, I had the opportunity to intern at Healthy Futures of Texas (HFTX). HFTX is a nonprofit that works to reduce unplanned and teen pregnancies through scientifically accurate, evidence-based education and advocacy efforts that empower young Texans everywhere to make well informed decisions for their futures. I applied to this internship through the Mexico, the Americas, and Spain (MAS) Alvarez summer internship program at Trinity University. This program provides students the opportunity to explore the MAS world and gain real-world work experience by interning at a non-profit organization that serves the Latino community. As an intern with Healthy Futures' project development team, I created a marketing plan for one of their new online curriculums, developed the 2022-2023 agenda for one of their youth development programs (the Youth Advocacy Council), launched a social media campaign for PRIDE month, and assisted my supervisor with field curriculum facilitations.

Working on these projects has been very rewarding as I participated in the same youth program for which I am now building an agenda. I also felt a special connection to the marketing plan I've been developing for Healthy Futures' new online curriculum, Permiso, as I helped co-create the curriculum in 2021. The experience has taught me the importance of marketing when it comes to promoting healthy behaviors. My internship as a whole has shown me the importance of good deployment strategies when it comes to navigating Texas' complicated sex-ed landscape. This poster will explore the importance of sexual health education in San Antonio, as well as the role the tasks I completed for this internship served in Healthy Future's greater mission of providing education and recources to Texans everywhere.

Funding Source: Mexico, The Americas, and Spain Alvarez summer internship program

Self-Assist with a Soft Pneumatic Self-Powered Exoskeleton

Camille Heidelbaugh*, Dr. Emma Treadway

Robot assisted rehabilitation therapies for stroke and other neurological disorders have received much attention, but have limitations in motor slacking [1] and rigidity which can be uncomfortable for the user. Motor slacking is an effect that takes place when the body reduces muscle activation levels in the presence of active assistance, hindering therapy effectiveness by reducing patient engagement. Self-powered robots can reduce this effect by using a healthy limb to power an impaired limb [2]. Prior research in this field uses self-powered techniques using a cable connection. We developed a soft, self-powered pneumatic elbow exoskeleton to analyze its effects on muscle activation in the bicep and the tricep long head muscles. Self-assistance is provided when fluid is displaced from the strong arm inner actuator to the non-dominant arm's outer actuator. When the strongarm flexes, it sends the displaced fluid to the outer arm, filling the outer actuator which bends the elbow inwards. TPU was used to create a durable but flexible actuator for the outer elbow with a 270 degree rotation to support the flexion of the elbow.

This summer, a human-participant experiment was performed to investigate the use of our soft pneumatic exoskeleton for self-powered rehabilitation. Participants performed horizontal curls in four randomized conditions: actuator open to atmosphere and activation of the non-dominant hand, open atmosphere and relaxed non-dominant hand, closed to atmosphere with activation of the non-dominant hand, and closed to atmosphere with a relaxed non-dominant hand. We used these trials to compare muscle activation data from the EMGs, position data from inertial measurement units, and pressure from the bellows to compare how much the muscles were activated in each trial. Using this data, we aim to further understanding in stroke rehabilitation for a self-assist exoskeleton.

Funding Source: Faculty startup funds

[1] D. J. Reinkensmeyer, O. M. Akoner, D. P. Ferris, and K. E. Gordon, "Slacking by the Human Motor System: Computational Models and implications for robotic orthoses," *2009 Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 2009.
[2] E. P. Washabaugh, E. Treadway, R. B. Gillespie, C. D. Remy, and C. Krishnan, "Self-powered robots to reduce motor slacking during upper-extremity rehabilitation: A proof of concept study," *Restorative Neurology and Neuroscience*, vol. 36, no. 6, pp. 693–708, 2018.

On a Mission: Intersecting Nonprofit and Public Sectors

Lydia Heisel*, Dr. Emilio de Antuñano

I was afforded the unique opportunity to intern at Mission Heritage Partners, the nonprofit that supports the San Antonio Missions National Historical Park and UNESCO World Heritage Site. It is necessary to have a nonprofit in support of the San Antonio Missions National Historical Park because it is difficult for the park to advocate for themselves since they are a part of a government agency and federal funding sometimes falls short in covering expenses for all the projects and employees that the park needs to support. In this role, I had the chance to experience both the nonprofit and federal environment that this place of historical significance relies on to be preserved and shared with current and future generations.

In my role at park headquarters, I had the opportunity to work under the supervision of the park archaeologist in an archival project, scanning and preparing park real-estate documents to be sent to the National Archives as they will soon no longer be accepting paper records. Here, I also went on several field visits to land and missions owned by the park and assisted another intern in a photo collection project, gathering photos of the missions' historical landscape from local community members. At Mission Heritage Partners, I sat in on board meetings, developed content for their various social media pages and edited and sent out their monthly newsletter.

Funding Source: Arts, Letters, and Enterprise program

Robotic Sampling: Motor Mounting Project for Rover

Adrian Herrera*, Dr. Kevin Nickels

This summer, I had the privilege of doing research with Dr. Nickels in the engineering science department. This research continues the development of an autonomous planetary rover. Prior groups designed and constructed the rover's suspension system, chassis, driving mechanism, and navigation sensors; and integrated the rover with navigation and control software. The result is a six wheeled vehicle that can drive around a relatively flat mapped environment. The previous driving mechanism failed after several hours of operation. This summer, I redesigned the driving mechanism, which includes electric drive motors and gearboxes. More specifically, I investigated and tested the control and mounting of a new drive motor, a system to support the weight of the rover, and a timing belt to convey power from the motor to the wheel with the comprehensive goal of reducing the radial load on the motor. After creating two scale models of the autonomous rover and measuring their performance, I applied what I learned to redesign the driving mechanism of the full-scale front-wheel drive rover. Future work will include a senior design project that will design an articulated suspension and steering motors.

Overall, this research has been a new learning experience and has meant a lot to me. I was able to design and build my own components using the laser cutter, 3D printers, and other tools in the CSI MakerSpace that I have not known how to use or would not have thought to have used myself. It has been fun learning and being exposed to new aspects of engineering design such as how to build a complicated assembly like a rover, how to program an Arduino for the first time, and how to tweak and figure out the best ways to create a useful product.

Funding Source: McNair Scholars Program

Modality Switching in Online Dating: Exploring Online Daters' Goals and Information Seeking Strategies Prior to Meeting Face-to-Face

Audrey Herrera*, Dr. Erin Sumner

Modality switching is the process of shifting from a cue-leaner channel, such as a dating app, to a cue-richer channel such as video-chat or in person interaction. Modality switching is likely to produce some uncertainty for online daters, as meeting face-to-face will test the participants' existing impressions of one another and potentially violate some of their expectations. Most research regarding online dating and modality switching has been quantitative, motivating our use of a more qualitative approach to the subject. We used thematic analysis to explore online daters' reasons for meeting potential partners face-to-face. Moreover, we examined the various information seeking strategies that online daters employ to reduce uncertainty about potential partners prior to meeting face-to-face.

Funding Source: Mellon Initiative

ReCap: Spend With Purpose

Joey Hersh*, Alex Garcia*, Max Hightower*, Ashwin Ramesh*, Carmen Aramanda

Our oral presentation is about the company that we had the privilege to develop over the summer, ReCap. Our main project is about an app of the same name. ReCap is a guidance app that allows a streamlined financial personal management platform to be right at your fingertips. We plan to reach and help those who are struggling in financial transition with specialized, tailored advice to help them reach their financial goals. To give this advice we run comprehensive data from receipt capture and transactions through our custom algorithm, which will give extremely specific tips and will help them see a tangible difference in their finances and mindset.

Funding Source: F.W. Olin E-Team Endowment

Christian Nationalism in the Museum of the Bible

Gisselle Hluz*, Vex Maxwell, Dr. Chad Spigel

This summer I was able to work on a project that focuses on the ways that the Museum of the Bible promotes Christian nationalism to its visitors. The Museum of the Bible serves as a way to educate the public about the history, impact, and importance of the Bible. However, many scholars have pointed out that the MOTB supports and even encourages Christian nationalism. The museum suggests they have an unbiased platform and are purely educational. Through the museum's connections with the Green family and the purposeful avoidance of the Bible's negative impact, the MOTB only furthers the idea that America is a Christian nation and should be run as such.

In analyzing articles, media coverage, and an in person trip to the museum, I was able to gather the necessary evidence to show that the MOTB implicitly promotes Christian nationalism. Many scholars who have visited the museum have critiqued the interactive exhibits that are in the museum. The "Impact in America" exhibit leaves out the negative impact the Bible has had on many marginalized groups, and in doing so, the Bible is painted as the book of truth and necessary for the progress of America. The inclusion of American figures who did not necessarily believe in the Bible furthers their point that the Bible was influential to the birth of America which can lead to the belief that America is a Christian nation. The confirmation bias that is used in the museum will only strengthen the existing idea of Christian nationalism which is harmful to the progression of the country.

McNair Scholars Program, Mellon Initiative

The Effect of Long-Wave UV Radiation on the Gene Expression of Human Astrocytes

Katherine Hoang*, Cora Lewis*,
Andrea C. Jimenez-Vergara Ph.D. and Dany Munoz-Pinto Ph.D.

Photopolymerization using UV radiation is a widely accepted method in the design and fabrication of biomaterials. Generally, this fabrication method utilizes low-dose UV light to facilitate the formation of crosslinked polymer networks such as hydrogels. Living cells can be embedded into the biomaterials to resemble key chemical and physical properties of healthy or diseased tissue. The resulting materials can be employed as tissue substitutes or disease models. Our laboratory focused on the fabrication of these disease models of central nervous system (CNS) tissue by photopolymerization using long-wave UV radiation.

However, during this process UV light generates free-radicals which can be potentially harmful to living cells. This project focuses on the evaluation of the effect of 365 nm UV light on the expression of senescence and inflammatory markers in human astrocytes at the gene and protein expression levels. Previous studies demonstrated that a low dose of 365 nm UV light does not significantly impact cell viability for several cell types. However, the effects of radiation on the inflammatory responses of CNS cells have not been extensively studied. Toward this end, commercially available human astrocytes from the hippocampus were exposed to 0.0 min, 5.0 min, and 10.0 min of 365 nm UV radiation at 6 mW/cm^2 and in the presence of Lithium phenyl-2,4,6-trimethylbenzoylphosphinate (LAP) as a source of free radicals. After UV exposure, the samples were incubated for 24 hours and collected for mRNA and protein analysis. We examined the changes in gene expression of human astrocytes exposed to UV light by conducting qRT-PCR analyses targeting the senescence marker, P21, and the inflammatory markers IL-1, IL-6, MMP1, and TNFα using Actin-β as a housekeeping gene. Preliminary results indicate that the expression of the selected markers at the gene expression level was not significantly impacted by long-wave UV radiation under the current experimental conditions.

Funding Source: National Science Foundation grant (NSF-2138684).

Creation and Development of CadPlexin, A Novel Chimeric Protein for the Selective Destruction of Synapses

Madison Horn*, Liliana Quiroga*, John Clark, Evan Farrell, Cole Williams, and Dr. Gerard M.J. Beaudoin III

To understand how the brain is wired, it is important to elucidate the specific information transferred between two regions. There are a number of methods used to study synapses, including synaptic labeling techniques and techniques for controlling synapses. While these methods are useful, there are no tools that can determine the role of individual synapses without affecting other outputs. For this project, we aim to create and develop a chimeric protein, CadPlexin, that will activate repulsion signals to selectively destroy synapses through homophilic binding between two cells connected at the synapse. CadPlexin is composed of the extracellular domain of common fruit fly DE-Cadherin and the transmembrane and intracellular domains of house mice plexin-B2. Cadherins are proteins that mediate cell-cell adhesion through homophilic binding. Plexins are signaling proteins that, when bound by semaphorin, elicit neuronal repulsion signals in the brain through cytoskeletal regulation. We hypothesize that CadPlexin will selectively destroy synapses, as the extracellular domains from DE-Cadherin will bind together and mimic semaphorin binding and clustering required to activate plexin signaling to induce repulsion. CadPlexin has been successfully cloned into a mammalian expression vector that coexpresses a fluorescent protein to mark the expressing cells and tested *in vitro* through transfection of Cos7 cells. Preliminary results suggest that the CadPlexin construct may elicit the ideal cell repulsion response. However, due to the size of the plasmid, transfection efficiencies are low, and results remain inconclusive. For more accurate determination of CadPlexin functionality, the construct will be cloned into a viral vector. The viral plasmid will then be used to produce a Lentivirus that can transduce cell lines, cultured neurons, or neurons in mice. This will allow us to determine if neurons expressing CadPlexin can receive synaptic inputs from cells that are not expressing CadPlexin, and not from cells that also express CadPlexin.

Funding Sources: Murchison Summer Research Fellowship, Trinity University Start-Up Funds, the Brain and Behavior Research Foundation NARSAD Young Investigator Award, Mary E. Groff Foundation, and the Flora Cameron Foundation.

A Garden-Based Education: My Summer with Gardopia Gardens

Emily Jamieson*, Dr. Kelly Lyons

During this summer ALE session, Nadia and I learned many things about community gardens, social engagement, and education. As well, our internship focused intensely on education and our programs, most notably at the Ella Austin Community Center, Young Women's Leadership Academy Primary (YWLAP), and Blessed Sacrament Academy (BSA). At Ella Austin, we created lesson plans and produced a brand new lesson about climate change for children ages 6-11. At YWLAP, we aided in the Phase 1B aspect of the urban farm project. Lastly, at BSA, we cultivated a garden and aided in garden lessons for preschool-aged children.

One main thing I learned was how to use ArcGIS. Using this system and learning how to survey, we measured the surrounding trees of the Ella Austin Community Center, creating a tree survey, able to be used to understand the kinds of trees in the area and how it affects the shade and gardening abilities of the area. Using that, I have put a GIS map of Trinity University on this poster. Moving forward, we are committed to improving the Trinity Community Garden and using our new skills to improve our career goals and community engagement. Through this internship, I have discovered a newfound passion for community engagement, as well as teaching and gardening. Working with Gardopia has shown me the importance of engaging with the youth and community while teaching them and guiding them through gardening and lessons about sustainability.

Funding Source: Arts, Letters, and Enterprise

A Class of Mapping Tori are Automatic

Benjamin Gustafson*, Benjamin Jeffers, Dr. Natasa Macura

Mapping tori are a topological construction that have a rich geometry. We define a class of mapping tori that we call linearly-mismatched. In their 1995 paper, G. A. Niblo and L. D. Reeves showed that groups acting on CAT(0) cube complexes are biautomatic. Automatic groups are finitely generated groups whose elements and multiplication can be characterized by finite state automata. More strongly, a biautomatic group has finite state automata for both left and right multiplication. We use similar methods to Niblo and Reeves to prove that mapping tori that are not linearly-mismatched are biautomatic. This tells us that these groups have very nice algorithmic properties, including no more than a quadratic isoperimetric inequality and a quadratic word problem.

Funding Source: McNair Scholars and Murchison Fellowship)

Modeling Fault-Related Fracturing Associated With a Segmented Normal Fault: Implications for Geothermal Energy Potential

Audrey Jennings*, Dr. Ben Surpless

Geothermal energy is a promising renewable resource, but it can be challenging to identify locations with high geothermal potential. Productive geothermal systems commonly occur in regions of extensional or transtensional strain where long-term stress creates fractures that permit fluid flow, especially where fracture density is high. These high-density fracture zones often form and grow adjacent to segmented normal faults where stress is affected by multiple fault segments. Many regions in the Basin and Range Province fit this description, making it an important area for geothermal investigation.

The segmented Sevier fault in southern Utah has accommodated extensional stress between the Basin and Range Province and the stable Colorado Plateau since the Miocene. In the field, we measured the orientation and intensity of fractures at multiple sites along the Sevier fault, generating a spatial distribution of damage within and adjacent to the fault zone. In the lab, we are using *Move 2020* software (by *Petex*) to model the evolution of stress orientations and intensities associated with a single propagating fault. Because fractures form in response to stress field changes, these models provide insight into how fracture zones differ among varied fault geometries. We are also modeling how different types of fault linkage affect fracture system formation. By comparing our modeled results to those observed in the field, we will broaden our understanding of fracturing associated with different fault zone geometries. This work will provide insight into the geothermal potential of the Sevier fault zone and other segmented normal faults within the Basin and Range Province.

Funding Sources: 1) NSF Grant Awarded to P.I. Ben Surpless; and 2) NSF Grant Awarded through the Keck Geology Consortium to P.I. Ben Surpless

What actors Determine People's Authoritarian Values: The Evidence from Fourteen Asian Societies

Andrew Jett* and Dr. Yen-Hsin Chen

People's authoritarian values vary across different types of societies. That is, we know that some people in democratic countries might hold high levels of authoritarian values, while some people in authoritarian countries might hold low levels of authoritarian values. This project aims to explain these variances by taking individual and structural factors into talk to know what factors shape individual liberal-authoritarian attitudes in different types of societies.

In this project we use Asian Barometer Survey Wave IV to conduct empirical research. This Asian Barometer Survey Wave IV dataset was conducted in 14 Asian countries/societies from 2014 to 2016, and the surveyed societies vary in regime types: among the 14 societies, 4 of them were categorized as free countries, 6 were partly free countries, and 4 were not free countries according to Freedom House. Therefore, it is an ideal dataset for conducting empirical tests.

In addition to existing literature that largely emphasizes the impact of individuals' political and economic conditions on people's authoritarian values, we mainly focus on religion and education to investigate how these two factors affect people's authoritarian values and why. We believe that failure to interact with others with different values and ideas will lead to a higher level of authoritarian values. More specifically, we use the variables of education and religiosity to measure interaction with other ideas. Higher levels of education will expose people to new ideas, either by meeting new people or through education itself, while people who are more devoutly religious or part of a religious majority will be further integrated into their own community, and therefore will likely have less interaction with differing ideas.

Funding Source: Mellon Initiative

Synthesizing a Water-Soluble, Fluorogenic Monomer Probe Utilizing SuFEx Click Chemistry

Elaine Kaster*, Curtis Wong*, Hanna Femmel*, Dr. Christina B. Cooley

Anthracene methacrylamide monomers are fluorogenic probes which, upon their radical polymerization, signal polymer growth by revealing fluorescence upon incorporation into the growing polymer chain. This will be utilized to detect analytes in disease detection assays. However, due to the hydrophobicity of our current probe, the polymerization requires a detergent; the detergent limits the maximum fluorescence of synthesized polymers in aqueous media, negatively affecting the assay's detection limit and the probe's potential for biodetection applications. Through the addition of an ionizable sulfonate group, we aim to synthesize an intrinsically water-soluble fluorogenic monomer probe to circumvent the need for detergent.

Direct sulfonation of the monomer or its precursor is unattainable. To bypass this issue, sulfur (VI) fluoride exchange chemistry will be utilized to conceal water solubility in our precursor through installation of a fluorosulfonyl tag. Following monomer construction, the sulfonate will be exposed at the desired site. We will discuss our progress towards the synthesis of this water-soluble, fluorogenic anthracene monomer probe.

Funding Source: The Welch Foundation, National Science Foundation, Cowden Foundation

The Art and Science of Audience Engagement: Lessons from a Museum Intern

Kate Borgmeyer*, Dr. Jacob K. Tingle

This summer, I had the opportunity to intern at the San Antonio Museum of Art (SAMA) in the Marketing Department. SAMA is a cultural institution that collects, preserves, exhibits, and interprets art for the purpose of providing the public with engaging and educational art experiences. I applied to this internship through the Arts, Letters, and Enterprise program at Trinity University, and this program has provided me with an incredible experience to explore a nonprofit organization in the humanities and my career field of interest while also gaining valuable academic and professional experiences and connections. As the marketing intern at SAMA, I coded and interpreted survey response data, coordinated the installation of streetlight banners to advertise SAMA in the downtown area, designed a mini video series for SAMA's upcoming exhibition, and organized live surveying of SAMA visitors in the galleries.

Through my work with the marketing department, I learned how to be persistent when collaborating within and outside of my organization, how to be creative and cater to my audience when designing projects for the general public, and how to persevere and remain curious when faced with unfamiliar tasks. I developed my skills in Excel and Adobe Premiere Pro as well as in communication in-person, on the phone, and in writing - whether that was in online posts or in communication with other organizations. I learned an immense amount about how nonprofits approach the task of drawing in visitors and engaging the community, specifically how they attempt to diversify their audiences, how interdepartmental communication is essential, and what challenges they encounter along the way. This internship was a wonderful experience, I learned a plethora of new skills, and I am grateful for the incredible opportunity.

Funding Source: Arts, Letters, and Enterprise

Growing Healthy Communities with Gardopia

Nadia Kern*, Dr. Kelly Lyons

Through the Arts, Letters, and Enterprise program at Trinity, I accepted an internship with the local nonprofit, Gardopia Gardens. This organization is a 501c(3) nonprofit whose mission is to grow healthy communities through garden-based learning. Their vision for the community is a sustainable society that is empowered and educated to lead healthy lifestyles through gardening. As an athlete, in a family of teachers, *and* with Environmental Studies major, I personally align with the organization's values of health, education, and the environment. Alongside another intern, I worked with Gardopia Gardens to bring them closer to the organization's vision of a sustainable, healthy, and educated environment…but there is still a long way to go.

This internship has allowed me to gain experience teaching classes, in the garden, and with creating social media content. During the Ella Austin summer program, I taught classes of children ranging from 6-12 years old, helping me gain confidence with teaching and forcing me to deeply understand the material. I also learned how to formulate a lesson plan and create one of my own about climate change. The most consistent tie-in for each lesson at Ella Austin was gardening, so I had to develop both basic and advanced gardening skills in a short amount of time. I learned about design, watering, compost, weeding, harvesting, tools, and irrigation installation–just to name a few. If I was not at a school or in a garden, I was creating videos and posting content for the organization's Instagram and Facebook. I promoted existing content from their Youtube channel, as well as created highlight videos using Adobe Rush, Canva, and Business Suite. Throughout this internship, I applied both my Environmental Studies and Communication majors while additionally gaining experience with teaching, a potential career path for me.

Funding source: Arts, Letters, and Enterprise

Fabrication and Characterization of Nanopattern Gold Substrates to Support FRET Enhancement

Andra Key*, **Evan Engelhaupt**, Dr. Jennifer Steele

Nanopattern gold substrates are fabricated using a Template Stripping method. The surface plasmons generated on these gold substrates will be used in the enhancement of Förster Resonance Energy Transfer (FRET) between Cy3 and Cy5 molecules spaced by DNA. We purchased a master silicon nanograting pattern containing lines with a height of 120 nm, a width of 250 nm, and a period of 500 nm. First, a copy of the master grating is molded using polydimethylsiloxane (PDMS). The PDMS is then peeled off of the master grating to reveal a perfect inverse pattern, which is then coated in a 50 nm layer of gold using a gold sputter coater. The gold is then transferred to a clean glass slide with an adhesive, resulting in a gold replica of the grating on the glass substrate. Following fabrication, this nanopatterned substrate is then characterized in two primary fashions: using an atomic force microscope to measure the topology and ensure proper transferring of the nanopattern, and then using white light spectroscopy to observe plasmons on the surface of the substrate.

Funding Source: This material is based upon work supported by the National Science Foundation under Grant No. 2004681

The Role of the Third Eye in Lizard Reproduction: A Study of Brain and Behavior

Mia K. Kholy*, **Grace E. Anderson**, **Taylor N. Black**, **Jeremy Blackburn**, **Akshaya Ranjit**, Dr. Michele A. Johnson

Almost all animals detect light through two lateral eyes. Yet along with these lateral eyes, lizards (and many other ectotherms) also have a third eye, referred to as the parietal eye. This third eye is a translucent scale at the top of the head that supplies light to the pineal gland in the brain, which regulates daily behavioral and physiological cycles. While known to be involved in melatonin production and thermoregulation, the role of the parietal eye in reproduction is largely unknown. In this study, we altered the exposure of light to the parietal eye of *Anolis sagrei* (brown anole) lizards, a species that uses photoperiod as a cue for reproduction. We captured 42 wild brown anoles (21 male, 21 female) and used paired arena trails (different sex and same sex) to identify a behavioral baseline. Then, "scale caps" (blackened queen bee marking tags) were glued onto the translucent scale of 22 lizards to block light from entering the parietal eye; for the other 20 lizards, which served as a control group, scale caps were glued directly behind the translucent scale, and did not block light from the parietal eye. After four weeks, the lizards will again undergo behavioral trials to determine behavioral differences between the experimental and control groups, and we will collect their brains, testes, and fat pads to compare physiological differences. Overall, this study will further our understanding of the incredible parietal eye and the role it plays in seasonal cycles driven by light exposure.

Funding Source: Murchison Fellowship

Minimal Affinity Tags

Lauren Kimberly*, **Sarah Chang***, **John Fontenot***, Dr. Adam Urbach

Attaching affinity tags to proteins is widely used to enable protein purification. Affinity tags are often large and can alter the properties of the protein of interest. The current project aims to identify minimal affinity tags for proteins in order to have minimal impact on the properties of the protein of interest. These minimal affinity tags are bound selectively by the synthetic receptor cucurbit[8]uril. This summer, we have worked toward optimizing dipeptide sites for cucurbit[8]uril at nonterminal sites. The background and current state of the project will be presented in the talk.

Funding Sources: Welch Foundation, Trinity University

Modeling the Glass Transition With Biomimetic Surfaces

Omarree Kimbrough*, Dr. 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.

Funding Source: McNair Scholars

Investigating the Molecular Mechanism of Yeast Phenotypes Conferred by Disease-Related Mutations in Fig4

Anna King*, Asha Thomas, Harrison Hall, and Dr. Bethany Strunk

Mutations of the lipid phosphatase Fig4 cause neurodegenerative diseases in humans including Charcot-Marie Tooth Disease Type 4 (CMT4J) and Amyotrophic Lateral Sclerosis (ALS). Fig4's known function is to regulate PI3,5P2 levels within the cell through association with the Fab1-Fig4-Vac14 protein complex. Fig4 disease mutations are impaired in association with Fab1 and Vac14 and display altered levels of PI3,5P2. Maintaining PI3,5P2 levels is critical for cellular homeostasis and mutations in Fig4 are assumed to cause disease through disruption of PI3,5P2 synthesis and turnover related to altered function of the Fab-Vac14-Fig4 complex. However, our data indicate that Fig4 mutants that impair association with Fab1 and Vac14 can also promote growth on rapamycin at 37°C independent of Fig4 catalytic function.
We propose that when Fig4 is dissociated from Fab1 and Vac14, it is available to influence the activity of other cellular pathways to promote growth under these conditions. Other researchers found that a mutation in Fab1 (Fab1-6A) conferred a similar growth advantage on rapamycin at 37°C. We determined that this growth advantage was dependent on the presence of Fig4 and that disease related mutants of Fig4 supported this growth advantage just as well as Fig4-WT. We hypothesize that the Fab1-6A mutant confers a growth advantage by causing dissociation of Fig4 from the complex. We are using immunoprecipitations to determine if the Fab1-6A mutant alters its association with Fig4 relative to Fab1-WT. We are also testing whether growth at 37°C with rapamycin alters this association and whether this is influenced by the mutant status of Fig4. These experiments will allow us to determine if the growth advantage conferred by Fig4 mutants and that conferred by Fab1-6A are controlled by the same mechanism. These studies may provide insight into unrecognized contributions of Fig4 to human disease.

Funding Source: Voelcker Foundation

Plats, Policy and Protection: My Summer at the Greater Edwards Aquifer Alliance

Ava Kirchen*, Dr. James Shinkle

This summer I worked as an intern for the Greater Edwards Aquifer Alliance (GEAA), a non-profit dedicated to protecting the Edwards Aquifer and its recharge zone. I was tasked with assisting in fundraising, grant writing, and research. I was able to work closely with the GEAA staff to analyze plats along the aquifer recharge zone. I utilized this research to advocate for the financial support of GEAA's constructed wetlands project. Additionally, I gained a broader understanding of day-to-day life at an environmental non-profit through attending meetings and press conferences. In both settings, I was able to foster strong communication skills and improve my ability to network within the non- profit community.

A key skill that was strengthened during my time at GEAA was my ability to communicate in the professional world. I worked directly with my supervisor to write letters and mailouts focused on specific audiences. This outreach expanded my understanding of the non-profit fundraising world as I gained insight into the etiquette and professional language used in non-profit fundraising. Another key skill I acquired through GEAA was my understanding of public policy. As a political science major with interest areas in local elections and environmental reform, I found my time at GEAA to be immensely informative. My everyday work consisted of analyzing the plots of developments, known as plats, in the Hill Country area and ensuring that the region's developers continued to follow the laws that protect the Edwards Aquifer and its recharge zone. I felt that my research on zoning laws and water policy grew my passion for local issues and exposed me to the broader issues facing the San Antonio community. I am very fortunate to have grown my expertise in environmental protection through the Arts, Letters, and Enterprise program this summer.

Funding Source: Arts, Letters, and Enterprise

A History of Environmental Justice in San Antonio's West Side Communities.

Austin Klein*, Dr. Gregory Hazleton

San Antonio's history of water management is saturated by destructive floods, which are fueled by the city's placement next to the Balcones Escarpment and its proximity to the Gulf of Mexico. These flood events have historically resulted in the loss of hundreds of lives and many homes and workplaces. The most severe of these came in 1921, which saw both the North and West Sides of the city flooded by the overflowing San Antonio River and Alazán Creek, respectively. Yet the storm was not experienced the same. While the majority white North Side had its downtown buildings filled with water, the predominantly Hispanic and impoverished West Side saw entire homes washed away, alongside those who lived in them. More than 80 people from the West Side died or disappeared in the wake of the 1921 flood, yet repair and recovery efforts from the city's government focused almost entirely on the affluent North Side. These efforts included the construction of the Olmos Dam and a media campaign focused on downplaying the severity of the flood in order to keep the city attractive to investment. Meanwhile, the communities of the West Side were neglected or actively sabotaged as resources intended for rebuilding were siphoned away for use elsewhere in the city.

Utilizing Char Miller's West Side Rising as an initial guide, the purpose of this research is to map the history of environmental injustice in San Antonio, in which human forces have created an inequitable distribution of environmental burdens and benefits. Additionally, rather than abide and assist a narrative of cultural hegemony, this research will guide its discussion of environmental injustice through the exploration of patterns of subaltern resistance formed by those living on the West Side to promote environmental justice and build resilience among their communities.

Funding Source: Hixon Fellowship

The Importance of Cognitive Control in Preventing Positive Romantic Illusions

Grant Kramer*, Dr. Paula Hertel, Dr. Kevin McIntyre

Romantic partners tend to hold idealized perceptions of each other, called positive illusions. For example, people in relationships often view their partners more favorably than their partners view themselves, and consider their relationships more fulfilling than average. Positive illusions may occur because people are motivated to maintain idealized views of their partners in order to justify their commitment. To explore mechanisms that support motivated illusions, our research considered whether partner idealization is associated with phenomena of memory recall. In particular, retrieval-induced forgetting (RIF) describes the process by which repeatedly bringing to mind certain experiences causes forgetting of related experiences. We examined whether illusory perceptions of one's relationship are greater among people with higher levels of RIF, whose motivation to harbor positive illusions is supported by a tendency to selectively retrieve memories of certain experiences in their relationships and more easily forget related experiences.

RIF was tested using a conventional paradigm in which participants recall a previously studied list of words after retrieving novel words which were categorically similar to some of the studied words. RIF predicts that participants will remember more studied words that were not related to the retrieved words than those that were. Participants were asked to rate their relationship compared to unrealistic standards and to an average relationship in order to measure positive illusions.

Our results replicated previous research in finding retrieval-induced forgetting. Among non-depressed participants low in relationship investment (satisfaction and commitment), there was a negative correlation between RIF and positive illusions, such that those who scored higher on RIF harbored fewer positive illusions. There was not a significant correlation between RIF and positive illusions among non-depressed participants high in relationship investment. This suggests that RIF may allow unsatisfied partners to selectively recall negative experiences and forget related positive experiences, reducing their romantic positive illusions.

Funding Source: Murchison Fellowship

Oxytocin Decreases Contextual Fear Expression via the Central Amygdala

Aliya Lackan*, and Kah-Chung Leong, Ph.D.

About 6% of the world population will suffer from post traumatic stress disorder at some point in their lives, which demonstrates the importance of understanding the development of fear memories and potential treatments. Contextual fear conditioning is a technique used to quickly create associations between a specific context and an aversive stimulus. Upon returning to the context, rodents often display signs of fear, such as freezing. Pharmacological interventions are currently being explored as possible treatments to diminish fear memories, with recent evidence identifying oxytocin as potential therapeutic target as it has been shown to produce strong anxiolytic effects. Despite this, it is unclear what the neural underpinnings of this effect is, though the central amygdala is thought to be involved as a region of interest given its role in fear expression. In the present study, rats underwent contextual fear conditioning. Specifically rats were placed in a chamber and after a period of 10 minutes, received 7 1 mA shocks spaced 1 minute apart. After a total of 20 minutes, rats were removed. Conditioning occurred across two days. On day 3, rats received oxytocin prior to returning to the chamber. No shocks were administered at test. In Experiment 1, rats received peripheral administration of oxytocin (1 mg/kg; i.p.) prior to test. In Experiment 2, rats received intra-CeA infusions (1 microgram) of oxytocin prior to test. Results from both experiments indicate that oxytocin reduces the amount of freezing during the ten minute period on test day in comparison with the control groups, and that this effect is specifically driven through mechanisms within the central amygdala. These results highlight the need for research examining the ability of oxytocin to attenuate fear and stress, and illuminate the brain structure through which oxytocin may be mediating this therapeutic effect.

Funding Source: Murchison Summer Research Fellowship

The Impact of Storytelling as a Persuasive Communication Tool in Consumer Settings

Mariaignacia Larrain*, Dr. Mario Gonzalez-Fuentes

Stories have been with us since ancient times to inform and pass on common lessons across cultures. Stories are more than the form in which they are presented to the audience, be it a book or a movie; they are universal ideas with the potential to transform individuals. Compelling stories engage audiences, reducing their motivation to counter argue the message they encapsulate, generating a broader array of cognitive and emotional responses than the one pursued by traditional advertising. Our research project aims at exploring the way individuals respond to stories and their elements when confronted with a consumer decision. Our proposal's original objective was to identify a research gap in the literature and design a couple of experiments to test and address such gap. Ultimately, we were able to address multiple gaps in two studies, comprising seven experiments in total.

Study 1 (three experiments) explores how different elements of digital stories (social media posts) play a role in the audience's engagement. The stories we examine address mental health issues, a domain for which little research exists at this moment and can potentially derive implications for not-for-profit organizations and socially oriented campaigns. Study 2 (four experiments) looks at the role that ethnic and cultural cues embedded in storified communications affect consumers' willingness to endorse a brand's products.

Through this research project I've learned that the way of researching is much more complex than I originally anticipated. I thought the research questions were going to be readily available to me, but once I got invested into the research, I discovered that I had more questions I sought to answer. I discovered that research is not an immediate process, it takes a lot of time, effort, diligence and patience when it comes to coming up with ideas and collecting sufficient data.

Funding Source: Murchison Fellowship

Provenance of the Mariposa Formation, CA

Paige Langford*, Joelle MacDonald*, Caroline Strong*, Dr. Kathleen Surpless

The Late Jurassic Period is a critical time of tectonic evolution in the North American Cordillera due to changing plate motions. Tectonic models for the Klamath-Sierra Nevada segment of the Cordillera range from double subduction with continental transpression from the collision of the Insular superterrane to single subduction with continental extension from slab roll-back and changing plate direction and velocity. The Mariposa Formation was deposited during this Late Jurassic time. Because of the depositional age and location of the Mariposa Formation within the Sierra Nevada foothills, these Upper Jurassic metasedimentary rocks contain a geologic record ideal for further understanding the tectonic evolution of this time.

We collected 19 fine- to medium-grained meta-sandstone samples along ca. 135 km of the strike-length of the Mariposa Formation. We will complete U-Pb age and Epsilon-Hf (ε_{Hf}) analysis of detrital zircon from 11 of these samples to determine sediment provenance. U-Pb ages allow calculation of maximum depositional ages (MDA), which can be used as a proxy for the true depositional age of each sample because deposition was near an active arc. Using these MDA calculations, we can evaluate change in sediment provenance through time. We will then select a subset of Jurassic zircons for ε_{Hf} analysis to assess the relative contribution of oceanic and continental arc zircon to the Mariposa Formation. The results of our analyses will further contribute to our interpretation of Late Jurassic tectonics in this area.

Funding Source: NSF EAR 2052111

RNA Transcription Optimization for use in In Vitro Splicing Assays

Aaron Lee*, **Jonathan Hernandez**, Dr. Corina Maeder

Pre-mRNA splicing is the reaction that removes non-coding introns from pre-mRNA sequences to leave coding exons to create the mature RNA that can be translated. Splicing occurs after DNA is transcribed and posttranscriptional modifications are made in the nucleus. The spliced mRNA, containing all designated coding exons, will be transported out of the nucleus for translation into protein. The reaction requires a sequence of pre-mRNA to include a 5' exon, 5' splice site, intron, 3' splice site, and 3' exon for the spliceosome to correctly bind and facilitate the reaction. The spliceosome is a large, dynamic RNA-protein complex, which changes conformations as it transitions between the several states to conduct splicing. The splicing reaction includes the structural rearrangement of the five small nuclear RNAs (snRNA) and many proteins to facilitate the reaction. During the splicing reaction, the transition from the B to Bact is crucial to the splicing mechanism and is marked by the departure of several proteins, including essential U5 component Dib1. It has been previously established that Dib1 is involved in spliceosome assembly but its mechanism is unknown. To study the effects of Dib1 tail truncation mutations, we are performing *in vitro* splicing assays to observe the defects in splicing caused by such mutations using yeast cell extracts. To perform these assays, we need to synthesize Cy5-labeled ACT1 pre-mRNA. We have performed run-off transcription reactions to create Cy5 labeled pre-mRNA fragments for splicing assays. Additionally, we are troubleshooting in vitro splicing assays and will present these complex reactions.

Funding: Welch Foundation (Chemistry Department and W-1905-20190330)

From the Ground Up: Learning the Ins and Outs of Nonprofits at Magdalena House

Madison Lee*, Dr. Carl Leafstedt

Through the Trinity University Arts, Letters, and Enterprise program, I received the wonderful opportunity to intern at Magdalena House for the duration of the summer term. Magdalena House is a nonprofit organization that serves as a transitional home for single mothers who have come out of abusive relationships. Maghouse (a nickname for Magdalena House) helps resident mothers and their children through a dual-generation program, providing the opportunity for the mothers to continue their education and their children to do the same. There are also opportunities for therapy and activities for the mothers and their children, including training for finding job opportunities.

During my time at Magdalena House, I worked closely with the development team, meaning that a good amount of my work was focused around the upcoming annual gala, a major event for the organization. I learned how to use many different programs and apps (ex: GiveSmart, Donor Perfect, Asana, etc.) in order to learn about the ins-and-outs of nonprofits and fundraising. I also learned a lot of important professional skills related to being in a smaller organization or a professional environment, such as networking, grant-writing, and event planning. I additionally planned and created a social media project, titled “Instant Info,” which utilizes a template format in order to combine post subsections to create posts related to current events and campaigns. My time at Magdalena House has been insightful and a wonderful life experience, and I feel that I have more professional skills to further my career in the future with my psychology degree.

Funding Source: Arts, Letters, and Enterprise

Ear Canal Deformation Based Head Gesture Recognition

Youngone Lee*, Dr. Sheng Tan

Although current methods of inputs, such as voice recognition and touch inputs, allows human-computer interaction to a high level of accuracy, there are problems that input methods can't work through. Environments, such as using voice control in a noisy area or touch inputs while one's hands are occupied. In this work, we propose a way to recognize head gestures based on the ear canal deformation of the user using in-ear wearables as a solution to these issues and complement the existing technology's level of usability for those with limited mobility. Our solution centers around ear canal deformation which occurs when the user is speaking or moving their head, inducing dynamic motion of the user's unique ear canal's geometry. Therefore, recognition of head gestures through ear canal deformation is an optimal solution to implement in the previously stated situations.

Our proposed solution utilizes an acoustic sensing approach to capture the ear canal deformation with the built-in microphone and speaker of the in-ear wearable. Our technique first emits inaudible beep signals and records those reflected signals from the ear canal. Then we analyze the reflected signals and extract features corresponding to the ear canal deformation for the corresponding head gestures. With our work being the first of our field, this solution can pave a path to create another alternative to human-computer interactions.

Funding Source: McNair Scholars

Computational Analysis of Surface Induced Protein Folding of Human Islet Amyloid Polypeptide (HIAPP)

Amber Lewis*, Thuong (Lucy) Pham, Dr. Kwan Cheng

While it has been shown that accumulation of neurofibrillary tangles composed of hyperphosphorylated tau protein in the brain are a characteristic of Alzheimer's Disease (AD), there has recently been evidence found that HIAPP, more widely associated with type-II diabetes, also contributes to the onset of AD. These proteins cause cognitive decline by blocking neuronal pathways integral in memory and learning. In order to better understand the development of AD, we need to understand how amyloidogenic proteins (tau, beta amyloid, and HIAPP) form aggregates and how they interact with cell membranes. Using the all atom computer simulations generated by Dr. Cheng's lab, we explore the surface induced protein folding of HIAPP over a period of time, particularly the specific inter-chain hydrogen bond formation among the peptide chains.

Funding Source: Welch Foundation (W-2057-20210327), NSF (OAC-1531594)

The Possible Effects of Rieske Reduction Potential on Superoxide Formation in the bc1 Complex

Sonja Lisowski*, Graycen Hall*, Dr. Laura Hunsicker-Wang

The electron transport chain utilizes four protein complexes to generate an electrochemical gradient necessary for ATP synthesis. In particular, Complex III contains the Rieske protein responsible for the transport of one electron via a [2Fe-2S] cluster. The successful transfer of electrons relies on a matched 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, allowing the electron to be able to react with molecular oxygen to produce superoxide. Superoxide is a form of reactive oxygen species (ROS). Thus, a mismatch in reduction potential between the Rieske protein and quinol may serve as a possible source of endogenous ROS.

To investigate this hypothesis, a two-pronged approach is being employed. The first element focuses on measuring the reduction potential, done in collaboration, of the isolated *Saccharomyces cerevisiae* Rieske protein (*Sc*Rieske) *in vitro* via cyclic voltammetry. For the first part of the project, several isolated *Sc*Rieske mutants are being produced, which alter different amino acids that are predicted to change the reduction potential of Rieske. The second part of the project centers on measuring the levels of ROS produced by intact *S. cerevisiae* Complex III (*Sc*Complex III) *in vivo* through the use of fluorometric confocal microscopy. In this part, the same mutants from part 1 are being produced in *Sc*Complex III, and are being analyzed using growth assays and confocal microscopy.

Funding Sources: The Welch Foundation, Walmsley Fund

Males, but not Females, Prefer a Socially-Paired Context over a Cocaine-Paired Context in a Conditioned Place Preference Paradigm

Eva Lorenz* and Kah-Chung Leong, Ph.D.

Cocaine is involved in nearly 1 in 5 overdose deaths in the United States. Although these death rates decreased between 2006 and 2012, they have begun to climb again, increasing by 9% in 2019 (CDC). Recent evidence demonstrates that cocaine use is diminished in individuals with strong social support systems, suggesting that social reward may combat the rewarding effects of cocaine. Sex differences are observed in both drug seeking behavior and social interaction. To examine the competing nature of cocaine and social reward, male and female rats were trained in a conditioned place preference paradigm in which one context was paired with cocaine (Males: 15 mg/kg, i.p; Females: 5 mg/kg, i.p.) while another was paired with social reward (i.e. social interaction). Briefly, conditioning occurred over 8 days alternating between the two neutral contexts and drug administration was counterbalanced within the groups. Results revealed that during test day male rats showed preference for the conspecific-paired context relative to the cocaine-paired context. The opposite effect was seen in female rats, where preference was shown for the cocaine-paired context over the conspecific-paired context. These results suggest that males may prefer social interaction over cocaine, while females continue to prefer cocaine over social interaction. Overall, the results demonstrate a fundamental sex difference in reward preference, indicating the importance of tailoring addiction treatments to each sex. Future research needs to be conducted to further understand the mechanisms underlying the observed sex differences and supplement the attenuation of cocaine-associated reward or enhancement of conspecific associated reward in female rats.

Funding Source: Beckman Scholars Award

Development and Validation of Immunoassays for Non-Human Primate Samples

Madeleine Hesselgesser*, Jessica Callery, Emma Mask, Dr. Jonathan King, Dr. Luis Giavedoni

Human and non-human primates diverged very recently in evolutionary history. While ethical limitations are placed on studies involving great ape species, several Old and New World Monkey species are suitable and critical for biomedical research. Two areas under investigation in our laboratory are the use of the Olive baboon (Papio anubis) as a model for HIV long-term non-progressors and the development of reagents for biomarker detection in New World Monkeys (NWM).

We are currently using supernatants of stimulated peripheral blood mononuclear cells isolated from NWM to validate newly developed immunological reagents. These reagents will be used in the detection of inflammatory cytokines with the Luminex platform, which allows quantification of several molecules in very small volumes and would improve the translational value of these monkey species.

In the study involving baboons, we evaluated the role of CD8 cells in control of SIV infection. One group of baboons was depleted of circulating CD8 cells, while a second group served as control; both groups were then infected with SIV. Currently, work is being done to highlight the conformational changes and distribution of immune cells in the lymph nodes of both groups of baboons via Immunohistochemical staining. These studies are expected to assist in identifying mechanism of natural control of immunodeficiency virus infection.

Funding Source: Brackenridge Endowment

Understanding the Covenant Chain: Settler-Haudenosaunee Diplomacy in Seventeenth-Century New York

Maeve Armand* and Dr. Erin Kramer.

In this project, we used a database of diplomatic council meetings between the Haudenosaunee nations and European colonial powers to examine how the concept of the "covenant" changed over time in the seventeenth and early eighteenth centuries. This ancient covenant or, in the Mohawk language kaswentha, was arranged by the original Dutch settlers and people of the Haudenosaunee nations. The Haudenosaunee nations recorded kaswentha in a wampum belt, the Two Row Belt, which has two separate rows of purple against a white background, a visual representation of their covenant relationship. This covenant was often renewed by both groups, which allowed for the relationship to continue being successful even after the English conquered the territory in 1664. As a written treaty documenting kaswentha no longer or does not exist, academic historians and Indigenous nations disagree over the terms of the agreement, just as European settlers and the Haudenosaunee nations in the past did not always agree on what it meant to uphold and preserve the covenant, as well as the expectations or obligations held between themselves. We used our database of over 1,000 diplomatic council records, built in part during SURF 2021, to analyze existing historical documents alongside oral histories such as the Great Law of Peace, which describes the Haudenosaunee system of governance. From working in depth with these sources, a conclusion that we have drawn is that although there is not a treaty of kaswentha, there are other sources such as Haudenosaunee oral tradition, the Two Row Belt, and meeting records between the Haudenosaunee and the Dutch that are able to demonstrate the longstanding importance of the covenant chain.

Funding Source: Mellon Initiative SURF

Pre Recorded Presentation

Urban Sidewalk Weed Guide to Central Texas

Grace Magavern*, Dr. Kelly Lyons

Field guides of Central Texas flora are generally specific to the Hill Country and focus on beautiful, relatively uncommon wildflowers, while the vast majority of plants in our day to day urban world are often considered unattractive weeds. In addition, while much of the plant biomass in urban areas consists of grasses, the current literature on these species is often sparse and too technical for the average user. Finally, an increasing number of exotic species are becoming more widespread in urban areas, sometimes crowding out native and endemic species, and the available literature has not kept up with the change in plant populations in urban areas like San Antonio, San Marcos, and Austin. This misalignment of information sought and provided limits the general public's ability to self-educate while engaging with the natural urban world available to them. Our aim, in collaboration with Ted Lee Eubanks, Austin photographer, is to develop an Urban Sidewalk Weed Guide of Central Texas that will make plant identification, knowledge, and appreciation accessible to all. Created for neighborhoods, downtown metropolitan areas, and urban parks, this guide will provide basic information about the most common plants. In addition, the guide will include ecological functions (including special value to pollinators, invasive and noxious status, and native/exotic status) and cultural functions such as medicinal, historical, horticultural, agricultural, and decorative uses.

Work during summer research was dedicated to improving the plant photography, finalizing the list of species to be included in the book, sorting out the taxonomy of each species, building mock ups of the book design, and compiling information on the selected plant species.

Funding Source: USDA, in collaboration with the National Center for Appropriate Technology.

Why Doing Nothing Can Mean Everything: How Sit Spot Practices in Nature Influence College Students' Mental Well-Being

Leah Marsh*, Dr. Ellen Barnett, Dr. Courtney Lambert-Crim, Dr. Laura Allen, and Dr. Benjamin Sosnaud

There is increased concern regarding college students' mental health and well-being. Affordable and accessible solutions that proactively address these concerns, rather than reactively struggle with the issue, are needed. Time spent in natural environments is associated with positive outcomes such as attention restoration, improvement in mood, and lowered stress levels. However, there is limited research that explores the potential restorative benefits of nature specifically within the college student population, and most existing research on the topic is framed with a quantitative design. This qualitative study addresses the research gap by exploring the restorative impacts of a course-embedded sit spot practice on college students' mental well-being. The sit spot practice refers to the act of repeatedly returning to a place of rest and intentional noticing in nature through the use of all five senses. This study is framed by Experiential Learning and Attention Restoration Theory. The research questions were: (1) How do students describe their experiences of a course-embedded sit spot practice? and (2) How do students' reflections on course-embedded sit spot practices change over repeated sessions? Participants were college students enrolled in an undergraduate course that introduced students to the benefits of natural environments on their physical, mental, and emotional well-being. Twenty-three students engaged in a minimum of 10 sit spot sessions, for at least 30 minutes per session, throughout one academic semester. Participants reflected on each sit spot experience through a written narrative. Two-hundred-twenty-five sit spot reflections were analyzed using the qualitative analysis software, NVivo. Open and axial codes were combined to form themes that describe participants' experiences. Findings offer important implications for research and practice that support college students' mental well-being.

Funding Source: Murchison Summer Research Fellowship

Esperanza, Paz, y un mejor Futuro para Todo El Mundo: The Esperanza Center's Work to Build a Better Future for All

William Blaine Martin*, Dr. Carlos Vélez Salas

This summer, I was given the priceless opportunity of interning at the Esperanza Peace and Justice Center. The Esperanza Center is a nonprofit organization that actively works to preserve the rich culture and history of the Westside while opposing efforts to gentrify the area, promoting women's rights, advocating for the LGBTQ+ and BIPOC communities, and championing lower socio-economic group rights. I applied to this internship through the Mexico, Americas, and Spain (MAS) program at Trinity University. As an intern for the Esperanza Peace and Justice Center, I engaged in multiple tasks that focused on the above-mentioned areas at any given time. I delved into housing justice issues and gentrification related to tax, real estate, and federal policy. Additionally, I toured the increasingly-gentrifying Alazan Court area and helped to educate a Hungarian Roma nonprofit delegation on Esperanza's resilience. Furthermore, I attended and engaged in fervent discussion at multiple SAHA meetings that included the first Residential Council meetings and Able City Alazan Court plans; observed the first City Council Redistricting Committee planning process for zoning the San Antonio area; and attended City Council meetings. Finally, I completed academic research via press clippings and research recommendations from Trinity faculty on the effects of gentrification.

The events and research I have conducted have led me to realize that it is crucial to critically analyze what each person is saying when approaching the area of policy relating to gentrification, whether they be a member of the community, a nonprofit leader, or an academic. The only way to find a meaningful solution is to view the situations from all perspectives. This revelation came about after learning to research mortgage and tax rates of neighborhoods increasingly encroached on, essentially to predict which communities will be targeted by developers next.

Funding Source: MAS/Alvarez Summer Internship Grant

Silence Like Thunder: Queerness at Museum of the Bible

Vex Maxwell*, Gisselle Hluz, Dr. Chad Spigel

Washington DC's Museum of the Bible (MOTB) opened in 2017 on the heels of multiple controversies regarding its purpose, artifacts, and founders. Given the founders' evangelical beliefs and rising anti-LGBTQ+ sentiment among right-leaning politicians and religious officials, an evaluation of MOTB's presentation of sexuality is timely. Because the museum presents itself as a nonsectarian institution that aims to educate the public about the Bible, MOTB's presentation of sexuality in the Bible impacts how its visitors interpret the Bible's view on the subject.

Scholars argue that the biblical canons and surrounding noncanonical texts present multiple perspectives on sexual expression. From Solomon's 700 wives to Paul's emphasis on chastity, the Bible allows for many different- and often conflicting- messages about sex. My project studies MOTB's "Stories" exhibit to evaluate its presentation of sex in the Bible, and attempts to discern whether the museum presents an evangelical, anti-LGBTQ+ interpretation of biblical sexuality as the Bible's only perspective on sex. Furthermore, I will examine how the museum addresses (or fails to address) the Bible's legacy in queer culture and history by examining MOTB's "Impact" exhibit. My research will sublimate an existing hole in the literature about MOTB, providing a queer interpretation and evaluation of the museum that has, to my knowledge, not existed until now.

At the conclusion of my project, I will write a sample article for a Course-based Undergraduate Research Experience (CURE), which will be used during the Hebrew Bible course beginning in the fall of 2022. The aim of the CURE is to allow undergraduate students at Trinity to conduct and publish original research about MOTB's website.

Funding Source: Mellon Initiative

Deep Learning for Gene Function Prediction in Yeast

Cole McGuire*, Dr. 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. For almost two decades, there have been many attempts to characterize functions of all genes of the model organism *Saccharomyces cerevisiae,* or baker's yeast. Over the past decade, advancements in the field of machine learning have led to the creation of more powerful machine learning models compared to those used in previous yeast gene function prediction studies. This summer, I created a deep learning approach for yeast gene function prediction using neural networks and compared its performance to other successful machine learning techniques.

Neural networks are a machine learning model that attempts 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, i.e. input data with known labels, then updating its parameters based on whether the network's predictions are correct. My networks were trained on whole genome microarray data, which measures the expression level of all of an organism's genes in a variety of experimental conditions. By learning patterns in the expression of genes with known functional relationships, my network is able to discover previously unknown relationships between genes.

Using our current knowledge of biology and gene functions, I compared my network's accuracy, precision, and recall when predicting if genes are involved in mitochondrial inheritance to the previously published models bioPIXIE, MEFIT, and SPELL. Additionally, I compared the predictions of functions for specific genes to determine what kinds of functional relationships neural networks are best at predicting.

Funding Source: HEP Computer Science Fellowship

The Effects of Varying Levels of Fibrin on Astrocyte Behavior using a 3D Engineered Scaffold

Meagan McKee*, Swathisri Ravi*,
Andrea C. Jimenez-Vergara Ph.D., and Dany J. Munoz-Pinto Ph.D.

Neuroinflammation present in conditions such as Alzheimer's Disease (AD) and traumatic brain injuries has been a major target in recent biomedical studies. However, the chemical and physical complexity of the extracellular matrix (ECM) of central nervous system (CNS) tissue poses a challenge in collecting relevant and accurate data through *in vitro* studies. Traditional cell culture plates have two main limitations. Firstly, these plates exclusively culture cells in 2D, which is not representative of the 3D environment cells experience in the human body. Secondly, the rigidity of the plates is orders of magnitude higher than what is found in natural tissue and may induce unnatural cellular responses. In the last few years, our laboratory has developed a multi-interpenetrating polymer network (mIPN) of collagen type I, hyaluronic acid (HA), and poly(ethylene glycol) diacrylate (PEGDA) as an alternative to traditional culture plates. The composition of these hydrogels has been tuned to match the mechanical properties of a sample of human cortex tissue affected by AD.

This summer, we have built onto this previous scaffold by introducing a new protein, fibrin, to increase the complexity and accuracy of our model. Fibrin deposits are commonly found in the ECM of damaged and AD affected brain tissue, but it is unclear what the isolated effect of this protein is on CNS cells. We have identified four formulations of different fibrin concentrations that match the complex modulus of cortex tissue, and we examined the structure and mechanical properties of the mIPNs with confocal microscopy and dynamic mechanical analysis (DMA) using a TA Instruments 3100 mechanical testing device. Human astrocytes will be cultured in these modified scaffolds and their behavior will be evaluated targeting quiescent, reactive, and inflammatory markers at the gene and protein expression levels using qRT-PCR, immunostaining and western blotting.

Funding: This research has been funded by a grant from the National Science Foundation (NSF-2138684), the Murchison undergraduate research fellowship, and the Biology Summer Undergraduate Research Fellowship.

Does it Take a Village to Keep LGBTQ+ Youth Housed and Supported?

Anna Miller*, Abby Ottaway*, Chiara Pride, **Riley Ruchti*,** Dr. Amy Stone, **Andrew Walker*, Rain Wammack*.**

The Family, Housing, and Me (or FHAM) Project is a longitudinal qualitative study in collaboration with the University of California Riverside designed to capture the experiences of LGBTQ+ youth during their transition into adulthood. Specifically, the project focuses on the role of non-parental relatives and their contribution to youth's housing stability. With this research, we hope to add to existing literature that supports family and community efforts to keep youth safe and housed.

During the summer research session, our research team collaborated on project design, recruitment, and participant interviews. Project design consisted of preliminary research on LGBTQ+ youth housing, developing and workshopping the interview guide, and testing the guide through practice interviews. To recruit participants, our team attended community events, networked with South Texas organizations, launched successful social media campaigns, and created strategically branded content. We are interviewing LGBTQ teens ages 16-19 who live in South Texas and California's Inland Empire over Zoom.

The FHAM project is projected to continue through June 2023. During this time, initial interviewees will complete monthly surveys to track their housing status as well as their relationships with family members. The team will use this information, along with interview transcriptions, to analyze themes using NVivo. This research will be used to publish academic literature and provide community organizations and policymakers with data-driven resources.

Funding Source: National Science Foundation, Murchison Fellowship, MAS Alvarez Grant, and Donahue Internship Grant

Haptic Communication and Role Negotiation Through a Social Dance Connection

Miranda Mittleman*, Dr. Emma Treadway

The study of haptic communication between humans has the potential to inform sophisticated robotic systems with human-like responses. Haptic communication is a form of nonverbal interaction based solely on touch feedback. A sparsely investigated type of nonverbal communication is social dance, which provides insight into the intricacies of haptic feedback when considering the presence of roles. These roles, known as the lead and follow, are most frequently set before dancing begins, but authority can be negotiated between a pair of dancers while avoiding obstacles in a dancing environment.

This study evaluates role-based haptic communication in a dance-like interaction by examining force and displacement. Pairs of participants outfitted with motion capture inertial measurement units performed a one-dimensional partnered stepping task, communicating via a swing-dance handhold instrumented with pressure sensors. Each participant was assigned a role: the lead was instructed to move forwards or backwards, and the follow responded with their eyes closed, changing direction, starting, or stopping when initiated by the lead. During instances termed "rejects", the follow was cued to interrupt the lead-initiated motion, replicating a change in authority that sometimes occurs on an actual dance floor (e.g., to avoid a collision). Preliminary analysis of data found that, while most of the highest recorded forces occurred during follow-initiated rejects, these forces were not outside the range of overall forces present in the experiment. Since the follow was able to signal to the lead their intent to cease motion (therefore initiating a change in authority) with forces on-par with the lead's forces, it is inferred that human-robot pairs may do the same. Ongoing work will examine the role of arm stiffness in the participant's haptic responses by modeling the pair as a mass-spring-damper system.

Funding Source: Murchison Summer Undergraduate Research Fellowship

Exploring the Physical and Chemical Properties of Levitated Microdroplets

Katie Morton*, Anna Olinger*, Teresa Palacios Diaz*, Dr. Ryan Davis

Atmospheric aerosol particles play a large role in climate and air quality. The physical and chemical properties of aerosol particles influence the aerosol impact on air quality and climate. However, the physico-chemical properties of these aerosols are poorly understood, which represents a source of uncertainty in air quality and climate models. Here, we study the viscosity, humidity-dependent phase state, and the chemical composition of organic-inorganic compounds to gain insight into the aerosol impact on climate.

Compounds found in microdroplets can assume a wide range of physical states depending on the relative humidity (RH). However, a comprehensive understanding of the rheological properties of mixed organic-inorganic aerosol remains lacking. Particularly, the role of solute-solute interactions is poorly understood because the solute concentration in aerosol micro-environments can greatly exceed what is possible in bulk solutions. Using a dual-balance quadrupole electrodynamic balance (DBQ-EDB) to merge levitated microdroplets under variable RH conditions, along with various imaging techniques, we characterize the rheological properties of microdroplets. In addition, the DBQ-EDB can be coupled to a mass spectrometer. With these novel analytical techniques, we identify properties of levitated microdroplets such as phase transition, viscosity, and chemical composition. Additionally, we have collected ambient aerosol particles using an inertial impaction filter to characterize atmospheric aerosol in San Antonio.

Furthermore, reactive oxygen species (ROS) are important drivers of atmospheric chemistry and can be detrimental to biological processes. Processes that lead to ROS production are poorly characterized, particularly in microdroplets where the relative importance of interfacial processes is higher than in bulk solutions. With the DBQ-EDB, ROS formation can be analyzed using fluorescence spectroscopy and the addition of gaseous reactants. This allows the characterization of microdroplets and their products following various reactions. Combined, our studies of aerosol properties can ultimately improve climate and air quality projections that consider aerosol phase and composition.

Funding Source: Trinity University, National Science Foundation

The Effects of Oxytocin Administration Directly into the Dorsal Hippocampus on Cocaine Seeking Behavior in Male Rats

Chase Moye*, Dr. Kah-Chung Leong

Cocaine drug abuse dramatically affects individuals' lives nationwide. The 2020 National Survey on Drug Use and Health (NSDUH) estimated that 1 in 5 drug overdose deaths involve cocaine. Although peripheral oxytocin administration has been shown to diminish cocaine seeking behavior in rats, more research must be conducted to establish which brain structures are involved in this effect. Cocaine conditioned place preference (CPP) paradigms offer the ability to measure cocaine-seeking behavior in addition to cocaine's motivating effects. Through this paradigm, context-drug associations are formed that subsequently influence behavioral preference for the drug-associated context. The dHC plays a key role in processing spatial and contextual information, and is therefore integral in mediating CPP.

Given the robust expression of oxytocin receptors (OXTRs) in the dorsal hippocampus (dHC), the present study sought to compare the potential benefits of oxytocin administration directly into the dHC on expression of cocaine CPP. After rats completed conditioning trials in which cocaine was paired with a context, they were administered either oxytocin or saline into the dHC and allowed to freely choose in which context to spend time. Our results revealed that while saline-administered male rats successfully displayed cocaine CPP, oxytocin administration directly into the dHC produced robust effects on cocaine seeking behavior in male rats. While the dHC has long been established as a key structure necessary for CPP, these findings highlight the potential mechanism through which oxytocin may be attenuating cocaine-context associations in a CPP paradigm.

Funding Source: Murchison Summer Research Fellowship

Improving Choanoflagellate Model Using Regularized Segments

Zachary Moyer*, Dr. Hoa Nguyen

Choanoflagellates are the closest living relative to animals and act as both unicellular and colonial eukaryotes. Their morphology consists of an oblong cell body with a flagellum for movement and a collar composed of microvilli that are used to capture bacteria. To simulate their feeding behaviors, our current computer simulations calculate the inward flux of fluid to the collar and the choanoflagellate translational and rotational velocities given its prescribed flagellar movement. However, the method of regularized Stokeslets (MRS) requires using thousands of points to discretize a morphology of a single cell to match the simulated results with experimental data. Since a large portion of the discretized points are on the collar, the method of regularized segments (MRSE) can simplify the model. The idea is, along each microvillus, replacing a cluster of discretized MRS points with a regularized segment that has linearly distributed forces.

In this project, we found an optimal number of regularized segments to drastically reduce total memory consumption and computation time. The simulated results from the mixed method of MRS and MRSE matched the experimental velocity data and the inward flux calculations of the original MRS model. We then extended this simplified model from one cell to two cells to quantify how their angles affect the outputs. With the reduced computational strain and memory usage due to the mixed method, larger colonies of four to eight cells could be simulated to provide insight into the advantage of multicellular feeding patterns.

Funding Source: NSF DMS-2054259 and NSF MRI-ACI-1531594

Museum Curation and Representation: What does it look like for a curator to amplify marginalized voices?

Sofía Muñoz*, Dr. Lauren Turek

During the summer of 2022, I interned at the Blue Star Contemporary Art Museum with Jacqueline Saragoza McGilvray, Curator and Exhibitions Manager. Using my time there as a case study, I will explain how the work of a curator can make accessible exhibits that amplify the voices of historically marginalized populations. Through work with Ms. McGilvray, I have observed what different aspects of curation look like when approached with the perspective of promoting the voices of artists and creating an accessible space. Using things such as exhibit layout, curator statements, and even copy editing, I have learned that the position of a curator is less creation, but translation.

McGilvray's work begins with an idea, but this idea is less about telling a story than it is about finding and weaving together stories which have already been told. Sometimes she works to immerse visitors, such as with the *Veterans Book Project*, in which she laid out the books on sawhorses and plywood to mimic to materials used by soldiers stationed in Iraq. *The Other Side* is another exhibit she curated which gives voice and space to artists who likely would not have been seen by many San Antonians because they're based internationally. Ms. McGilvray brings work to Blue Star which is usually kept for those who are privy to the art scene, allowing families and everyday people to hear what artists have to say.

In all, the job of a curator can vary depending on the task but keeping the perspective of narration and translation can allow a curator to create meaningful and accessible exhibits which can give voice to individuals from historically unheard communities.

Funding: McNair Scholars Program

3D Modeling of the Sevier Fault Zone: Analyzing the Validity of Structural Interpretations

Jasper Neath* and Dr. Ben Surpless

The Sevier fault zone near Orderville, Utah, represents a segmented normal fault system within the transfer zone between the Basin and Range Province and the Colorado Plateau. The interactions of these normal fault segments led to the development of complex structural geometries presently exposed along the fault zone. These geometries are important because they influence deformation and create fractures that affect permeability and fluid flow within and adjacent to the faults. Therefore, these geometries have implications for groundwater flow and geothermal energy potential within segmented fault systems.

We are using the *Move2020* modeling suite by *Petex* to develop a viable 3D model of the Sevier fault zone initially based on published geological maps and cross-section interpretations. With these data as a base, we apply the *Create Fault* and *Create Horizon* tools to digitize layer and fault horizons to build our initial 3D model. We use these tools to test the 3D structural validity of our initial model because earlier researchers' subsurface interpretations were based on surface mapping rather than direct documentation of subsurface fault and layer geometries. If the line lengths of modeled horizons/fault surfaces are inconsistent, the interpreted structural geometries of previous researchers' interpretations are invalid and we will correct these interpretations using the *2D Section Analysis*, *2D Move On Fault*, and *3D Move on Fault* restoration modules in *Move*. Ultimately, this 3D model will provide a more detailed view of how segmented normal fault zones evolve. Other workers can use this model to predict the orientation and intensity of fracturing, which impacts permeability and fluid flow.

Funding Sources: 1) NSF Grant Awarded to P.I. Ben Surpless; and 2) NSF Grant awarded through the Keck Geology Consortium to P.I. Ben Surpless

Hemisphere-Specific Characterization of Glutamatergic Projections from the Pedunculopontine Tegmental Nucleus to Substantia Nigra Pars Compacta Dopaminergic Neurons

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

Dopamine plays an important role in communication between neurons, notably in the nigrostriatal dopaminergic pathway. This pathway is involved in motivation and reward-seeking behavior, including drug addiction. Our research focuses on the synapse between the midbrain regions pedunculopontine tegmental nucleus (PPN) and substantia nigra pars compacta (SNc). The PPN is composed of neurons with unique connectivity and distinct firing characteristics. While many brain regions send output projections exclusively to the same side, ipsilateral, or the opposite side, contralateral, the PPN appears to send both ipsilateral and contralateral projections. As these bilateral innervations have not been thoroughly characterized, our research explores the nature of ipsilateral and contralateral glutamatergic projections from the PPN to the SNC using electrophysiology and confocal microscopy. Specifically, we aim to investigate how hemisphere-specific excitatory inputs differ in synaptic strength.

By stereotaxic surgery for intracranial injections of virus, yellow fluorescent tagged blue-light sensitive Channelrhodopsin (ChR2) was expressed on a single side of the brain to characterize neuronal fibers involved in the PPN-SNC pathway. Succeeding electrophysiological tests were performed in which we selectively activate light-gated ion channels to depolarize PPN neurons and record synaptic activity onto individual SNc dopamine neurons. Data were collected and analyzed to quantify excitatory synaptic responses both ipsilateral and contralateral to the injection site. Finally, brain slices were immunostained with tyrosine hydroxylase to visualize dopaminergic neurons and vesicular glutamate transporter to quantify glutamatergic projections. Low magnification confocal images were collected to obtain a macroscopic distribution of the ipsilateral and contralateral excitatory projections in the SNc.

Preliminary findings demonstrate that the PPN projects bilaterally. Interestingly, the PPN exhibits stronger glutamatergic innervations ipsilaterally to SNc dopamine neurons than contralaterally. Our work will allow future studies of the nigrostriatal dopaminergic pathway to further elucidate the process of addiction taking place at the synaptic level.

Funding Sources: Murchison Summer Research Fellowship, Biology Summer Research Fellowship, Trinity University Start-Up Funds, McNair Scholars Program, the Brain and Behavior Research Foundation NARSAD Young Investigator Award, and the Mary E. Groff Foundation

Islamophobia and Europhobia in Cyberspace

Kenneth Nelson*, Dr. Peter O'Brien

Many characterize today as the "post-truth era" because of rampant "fake news." Through coordinated Internet campaigns, purveyors of "Islamophobia" argue that Islam threatens the West, while purveyors of "Europhobia" assert that the West poses a grave threat to Islam. This project argues that Islamophobes' and Europhobes' demonizing rhetorical strategies mirror each other. For example, when Islamophobes other Muslims by arguing that the Hijab oppresses women, Europhobes "reverse other" Western societies by arguing that revealing clothing objectifies and hypersexualizes women. Additionally, Islamophobes and Europhobes each accuse each other of fostering anti-intellectual cultures, opposing democracy, and launching expansionist, violent foreign policy campaigns.

To examine the origin, manifestations, and prevalence of Islamophobia and Europhobia, this project contains four parts. First, a literature review on social media's political impact determined that social media users are likely to form ingroups which propagate misinformation targeting outgroups. Second, a literature review on the relationship between Islamophobia and Europhobia revealed that "reactive radicalization" – the phenomena whereby Islamist and far-right extremists cite violent rhetoric and action from the opposing group to rally support for their respective cause – is widespread on social media and spurs acts of political violence offline. Third, algorithmic scraping of Islamophobic and Europhobic social media websites generated quantitative data demonstrating the prevalence and specific rhetoric associated with each Islamophobic and Europhobic stereotype. Fourth, a questionnaire administered to German youth with intercultural experience surveyed different rhetorical strategies which subvert Islamophobic and Europhobic tropes.

Funding Source: Mellon SURF Grant

Spatial and Statistical Analysis of Groundwater Contaminants in California's Central Valley

Mark Nickels*, Dr. Brady Ziegler

California's Central Valley is a water stressed region where groundwater pumping supports agriculture and drinking water supplies. However, the valley's groundwater contains contaminants including arsenic (As), hexavalent chromium (Cr(VI)), iron (Fe), manganese (Mn), and uranium (U) that threaten drinking water. These contaminants originate in aquifer sediments but can be mobilized into groundwater due to changing pH, redox conditions, and/or reaction with anthropogenically sourced chemicals, such as nitrate (NO_3^-) in agricultural fertilizer. My research used spatial and statistical analyses of data from the Groundwater Ambient Monitoring and Assessment (GAMA) program to characterize the geochemical changes that mobilize contaminants to concentrations exceeding safe drinking water thresholds. Results from multivariate statistics show that Fe, Mn, and As are closely related and are anticorrelated with both NO_3^- and dissolved oxygen, suggesting that they are mobilized from sediments in reducing redox environments. Conversely, U and Cr(VI) tend to associate more strongly with nitrate and dissolved oxygen and are likely oxidatively dissolved from sediment. Furthermore, the presence of elevated bicarbonate appears to stabilize U in groundwater via formation of uranyl-carbonate complexes. Using Geographic Information Systems, we explored the spatial correlation of 16 analytes in shallow and deep aquifers throughout the the Central Valley. In the north of the valley Fe, Mn, and As are correlated with reducing conditions, whereas in the south As is correlated with over pumping and subsidence in the deep aquifer. U and Cr(VI) are present in higher concentrations the shallow aquifer correlated with more oxic recharge conditions. Identifying where groundwater contamination occurs and the mobilization mechanisms will aid in developing groundwater protection and remediation strategies.

Funding Source: Hixon Environmental Studies Fellowship

Starting a Business as Engineers in the Music Sector

Gabriel Ogden, Paul Kim, Lucas Riley*, Alfonso Kamel, Dr. Luis Martinez

Skelton Musical aims to provide a more accessible and accommodating experience for musicians while also facilitating faster musical growth. At the start of this Summer, our team set out to create an affordable, efficient, and innovative alternative to the traditional method of musicians keeping their tempo, an audible metronome. After conducting interviews, developing functional prototypes, and attending various workshops and networking events, our team has achieved a better understanding of where we want to take not only our product, but our business. This includes important insight into our target audience: what features they want and who exactly they are. We have also been able to learn the process of creating an official LLC, setting up business and financial models, and going through the patent research and discussion process. In the context of business and financial modeling, we have been able to identify and focus on integral strategies and components pertaining to all stages of our business development, including estimations of revenue needed to offset expenses. Moving forward, Skelton Musical will use what we have learned to continue to develop our business and make the music industry more accessible and innovative, one product at a time.

Funding Source: F.W. Olin E-Team Endowment

Synthesis and Purification of α-Keto acids

Macy Oyala*, Jess Rugeley, Dr. Rebecca Rapf

The ocean is a vast reservoir of organic species that can interact with sunlight to generate more complex species. 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. Recent studies in the literature have highlighted the possible role that the interfaces can play in promoting reactivity and enhancing reaction rates compared to the bulk, including photochemistry. To study the effect of the interface on photochemistry, we examine a series of α-keto acids with varying alkyl tail lengths. The bulk aqueous photochemistry of α-keto acids is well-studied, allowing us to study how the surface partitioning of molecules can also affect the observed photochemical products. We are particularly interested in examining the chemistry of long-tailed α-keto acids, which act as insoluble surfactants, forming a monolayer at the air-water interface. Characterizing α-keto acids on the surface of aqueous environments is important to understanding the role of the SML as well as other atmospheric processes that occur in the natural environment.

This presentation focuses on the synthesis and purification of 2-oxomyristic acid, 2-oxostearic acid, and 2-oxoeicosanoic acid, which are 14, 18, and 20 carbon molecules, respectively. The synthesis primarily used Grignard chemistry under a positive pressure of nitrogen gas to optimize reaction conditions. The synthesized α-keto acids were then tested for purity by using a variety of analytical techniques. Interfacial films composed of a single monolayer of organics are highly sensitive to even trace impurities, affecting the observed phase behavior in Langmuir compression isotherms. We will report on the effectiveness of a variety of purification techniques. After purification, these α-keto acids were then photolyzed on the surface of water, to further understand the role of interfaces in the photochemistry of insoluble surfactants.

Funding Source: Chemistry Department Welch Grant and Trinity University Start-up Funds

Shakespeare en Spanglish: Borderlands Theatre

Paloma Díaz-Minshew, Dr. Kathryn Santos

This research will contribute to the second volume of an anthology entitled The Bard in the Borderlands: An Anthology of Shakespeare Appropriations en La Frontera. This anthology will be published as an open-access book that will be available to teachers, scholars, and artists, enabling culturally and regionally relevant teaching, research, and performance. It includes twelve unpublished plays that repurpose William Shakespeare's texts to reflect the multilayered histories of the U.S.–Mexico Borderlands. My portion of this project has focused on Measure por Medida, an entirely bilingual "tradaptation" of Measure for Measure, written by Mexican American playwright Bernardo Mazón Daher and set in San Diego, CA. Initially intended to be performed on the border, this tradaptation reflects the multilingual, bicultural reality of life in the Borderlands. Measure por Medida transforms Shakespeare's work into a regionally pertinent discussion of political corruption, sex, intersectional misogyny, familial duty, and moral perfectionism. My critical edition of this play includes footnotes that translate several instances of local Mexican/Chicano slang and offer contextual information for the benefit of the reader, but it deliberately does not translate every instance of Spanish into English. To do so would disrupt the decolonial project of Borderlands theatre that aims to push back against the cultural and institutional hegemony of English in a region where Spanish continues to be spoken widely in spite of attempts to suppress it. My introduction to this text, moreover, will encourage readers to examine how code-switching and language mixing reflect the social paradigms of the play, and it will offer a framework within which to understand the intersectional plight of Chicanas and Mexican women in the Borderlands.

Funding Source: Mellon

Poster Session Presentation 73

Is relationship-induced self-concept change associated with attachment security? Examining the attachment security enhancement model

Cecilia Parker*, Dr. Kevin McIntyre

Relationship-induced-self-concept change describes the changes that people experience to their sense of self that occur via the formation and maintenance of romantic relationships. Previous research describes four types of relationship self-change: self expansion (i.e. the addition of positive content), self-pruning (i.e.the subtraction of negative content), self-contraction (i.e the subtraction of positive content), and self-adulteration (i.e the addition of negative content). These self-processes are often associated with various relationship outcomes such as satisfaction and commitment, passionate love, and infidelity, as well as relationship maintenance strategies, such as willingness to sacrifice and accommodation. The current research examines whether self-change processes are associated with attachment security. Although attachment is often regarded as a relatively stable trait of an individual, research reveals that attachment security (and insecurity) increases or decreases in response to various relationship situations and experiences. We predicted that self-improvement processes (i.e., self-expansion and self-adulteration) would be positively associated with attachment security, whereas self-degradation processes (i.e., self-adulteration and self-contraction), would be positively associated with attachment insecurity (i.e., anxiety and avoidance). In a study of 291 romantically-involved adults, we found that self-improvement processes (e.g., self-expansion) were associated with increased attachment security, whereas self-degradation processes (e.g., self-adulteration) were associated with decreased attachment security (and increases in anxious and avoidant attachment). These findings support the notion that attachment security is malleable and tends to correspond to changes that occur to the self-concept as a result of romantic relationships.

Funding Source: McNair Scholars Program

Pre Recorded Presentation

From Archives to the Stage: Exploring the Impact of a Fifty Year-Old Professional Regional Theater

Scarlett Patiño*, Dr. Nathan Stith

Oldcastle Theater Company has been dedicated to bringing quality, professional theater to Bennington, Vermont for half a century and my main objective this summer was to uncover the story behind their success. For the past two months I have been digging through the dusty archives of Oldcastle to gain an understanding of the relationship between the company and Bennington natives. Through my research I have found that the community has been vocal regarding Oldcastle's location, choice of plays, and various financial factors, all of which Oldcastle considers while making business decisions. Despite the few critics of the company, there is a strong sense of support for the charming theater troupe that allows them to continually make a profit in smalltown Bennington, Vermont.

I have created an interactive timeline that features press releases, photographs, legal documents, and marketing materials that illustrates the evolution of the professional theater company. I am currently working on digitizing the archives of Oldcastle so they can be easily accessed by the theater. Dr. Nathan Stith has been my mentor for this project and will be using the consolidated records to work on his developing project about Oldcastle and its history.

In addition to archival research, I have become a member of the Oldcastle family by serving as the Assistant Stage Manager for two of their summer stock productions, *Souvenir* and *Fully Committed*. My ultimate goal is to become a professional stage manager and through Oldcastle I am gaining invaluable hands-on experience as well as professional theater connections.

Funding Source: Mellon Initiative

Applying Machine Learning to Investigate Lipid Domain Formation Behaviors in the Presence of Amyloidogenic Proteins

Thuong (Lucy) Pham, Amber Lewis*, Dr. Kwan Kelvin Cheng

It is known that biological lipid membranes are not always laterally homogeneous, but clusterized into nanoscale ordered lipid domains. These lipid domains are believed to play an important role for the organization of proteins in membranes and regulation of membrane's biological functions such as reproduction and transportation. However, these lipid domains are formed at nanoscale and are highly dynamic, which raises difficulties in studying their behavior experimentally. With high computational engines nowadays, we are able to visualize the neuronal lipid domains dynamically using Molecular Dynamics (MD) simulation; and by applying a novel unsupervised-machine-learning method called "Non-negative Matrix Factorization" (NMFk), the enriched information from the MD simulation can be extracted into two latent features, highlighting the formation of nanodomains ("Signatures") and the timescales of lipid segregation ("Activity"). These latent features would help with identifying the clusters as well as understanding the transient changes of neuronal nanodomains. Moreover, this analysis would reveal critical information about the disruptions of neuronal membranes in the presence of amyloidogenic proteins, giving an insight into the early events leading to Amyloidosis diseases such as Alzheimers, Parkinson, Diabetes type II, etc.

Funding Source: Welch Foundation (W-2057-20210327), NSF (OAC-1531594)

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

Queen Polin*, **Maddie Belvis ***, Dr. 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 valine, 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 Chemistry Department, The Welch Foundation, Murchison Summer Research Fellowship

Examination of the Relationship Between Public Transit Availability and Unemployment Rates in San Antonio, Texas

Polina Protozanova*, Dr. Arturo Vega

Via Metropolitan in San Antonio has become a unique case study in the United States as its development goes against several national trends in the public transit sphere.

This study examines the relationship between public transit availability (bus stops per tract) and unemployment rates, along with several control variables (poverty rates, race/ethnicity, transit use, high school graduation rates). I hypothesized a significant negative relationship between the independent and dependent variables. Although SPSS regressions confirmed the initial hypothesis, they also proved the relationship to be weak. Instead, data revealed the importance of poverty rates in public transit availability: the higher the poverty, the higher the transit availability. Via targets impoverished tracts of San Antonio to provide these vulnerable communities with horizontal mobility. From here, the study assesses just how well Via serves these vulnerable groups.

This research presents the very first statistical discussion of transit, unemployment, and poverty in San Antonio.

Funding Source: St. Mary's University Summer Undergraduate Research Fellowship (SURF)

An Overview of Access to the Fine Arts in Urban Centers

Julissa Ramirez*, Dr. Habiba Noor, Dr. Kate Ritson

This summer, I had the opportunity to participate in both an ALE internship at Blue Star Contemporary as well as conduct research as a McNair Scholar. In my research project, I sought to answer the questions of how socioeconomic status affects access to music education. Drawing on sociological research methods, I conducted interviews with music educators and conducted a survey with former students of public urban schools. While much of the research on school inequality centers around data on reading and math, this research contends that accessibility to music education is as diverse in quality as reading and math education, and that a lack of access to music education results in a replication of the inequality trends present in society today. The significance and purpose of this research is to bring awareness to the potential inequality in access to music education to parents, music educators, and education policymakers. Interning at Blue Star Contemporary, a contemporary art gallery and non-profit, made apparent a trend of unequal access to fine arts education that exists in urban centers. One of my roles at Blue Star Contemporary consisted of aiding in the planning and execution of educational programs that sought to reduce the same "opportunity gaps" that were perceivable in the music education research I was completing, except that the "opportunity gaps" Blue Star Contemporary sought to reduce existed in the visual arts discipline of the fine arts. My research as a McNair sought to understand the reasons why a lack of equal access to fine arts education exists, while my internship at Blue Star Contemporary provided insight into how one non-profit seeks to reverse the trend of unequal access to fine arts education. Together, both of my experiences this summer demonstrated a broader understanding of access to fine arts education in urban centers.

Funding Source: McNair Scholars program, Arts, Letters, and Enterprise

Make Sure You Get My Good Side! Brain Laterality in the Green Anole Lizard

Akshaya Ranjit*, Michael Patton, **Anna Sotiriades**, **Swathisri Ravi**, Dr. Michele A. Johnson

Behavioral lateralization occurs when the right or left side of an organism is preferentially used to perform a function, and is often underlaid by lateralization in the brain. Though lateralization has been observed in many species, reptiles offer an excellent model to understand how lateralization in brain and behavior may be associated, as all reptiles lack a corpus callosum, the net of fibers that facilitates communication between each side of the brain. The green anole lizard, *Anolis carolinensis*, is particularly amenable to these questions, due to its easily identifiable lateralized behaviors, including aggressive displays in which lizards orient to display from the right or left side of their body. In this study, we observed the lateralized behaviors of 18 wild-caught male green anoles and cryosectioned their brain tissues on the right and left side of the brain. We measured the volumes of structures involved in the visual processing system of anoles (nucleus rotundus, lateral geniculate nucleus, and the optic tectum) and those involved in aggressive display (preoptic area and amygdala). From there, we will compare whether the side a behavior is lateralized toward is associated with larger or smaller structures on the corresponding side of the brain.

Funding Source: Trinity University Office of Academic Affairs, Trinity University Department of Biology

X-Ray Observations of FUor Outbursts: Extreme Accretion Episodes in Young Stars

Madison Reich*, Dr. David Pooley

In general, the growth of a young star by accretion of material from a protoplanetary disk proceeds in a slow, steady fashion. Occasionally, the young star may experience a brief episode of intense accretion that is higher by orders of magnitude (perhaps by accreting something like a proto-Saturn). This episodic accretion is thought to be the cause of "FUor outbursts," in which the luminosity of a young star is seen to increase by orders of magnitude. These outbursts are rare, with only an average of about one discovered each decade. Historically, they have been studied only in the optical and in the near-infrared wavelengths accessible from the ground. We are systematically studying all newly discovered FUors in X-ray light.

Using data from NASA's *Chandra X-ray Observatory* in combination with data from the European Space Agency's (ESA's) *XMM-Newton Observatory*, we extracted X-ray spectra from recent FUor outbursts. We account for contamination from nearby, unrelated X-ray sources by extracting spectra from background regions. After modeling the spectra of the background emission, we fit models representing different physical processes to the FUor spectra. Namely, we fit a state-of-the-art Astrophysical Plasma Emission Code (APEC) emission spectrum model to represent emission lines caused by the collisions of high-temperature diffuse gas particles and the underlying bremsstrahlung continuum. In addition, we fit power law models to explore the possibility that the X-ray emission originates in an astrophysical jet associated with the outburst. Through this analysis, we found estimated values for the absorbed and intrinsic energy fluxes of an FUor outburst, which correspond to the apparent luminosity and intrinsic luminosity of the FUor. With these constraints, future theoretical modeling will determine the physical processes behind the triggering of FUor outbursts.

Funding Source: Murchison Summer Research Fellowship

Overcoming Class, Social, Academic and Cultural Barriers to Obtaining a Higher Education

Daisy Rodriguez*, Dr. Rocio Delgado

This summer I had the privilege of interning with Upward Bound through the Mexico, the Americas and Spain Program (MAS) program. Upward Bound is a program that serves low-income and first-generation students. It is one of eight TRIO programs that was created under the Economic Opportunity Act of 1964, a War on Poverty initiative. This program currently serves four different high schools in San Antonio, where a majority of their students primarily come from Hispanic households. This program aims to help students be able to overcome barriers that they face in their path obtaining a higher education. Through this program, students are provided with resources that will help them navigate the challenges that come with preparing to go to college.

As an intern with Upward Bound this summer, I have been a part of different projects. These projects have consisted of planning the summer program, ordering supplies for classes, designing a T-shirt for the students, and creating swag bags that included supplies for the students. These items might seem minimal, but they help students not have to worry about getting their own school supplies and make resources accessible to them. I have also had the opportunity of teaching two different classes and engaging with the students. Through this internship I have been able to use my own experiences as a Latina, first-generation college student to be able to serve as a mentor for the high school students. I have also been able to learn more about the education system and work to help underrepresented students in the San Antonio Community. I see the urgent need to address the inequalities within the school system and the lack of resources distribution to underrepresented students.

Funding Source: Mexico, the Americas and Spain program (MAS)

Hemisphere-Specific Characterization of GABAergic Projections from the Pedunculopontine Tegmental Nucleus to Substantia Nigra Pars Compacta Dopaminergic Neurons

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

The neurotransmitter dopamine has been shown to be implicated in motivation and reward, notably in the nigrostriatal dopaminergic pathway. Within this pathway, our research focuses on the synapse between the midbrain regions pedunculopontine tegmental nucleus (PPN) and substantia nigra pars compacta (SNc). The PPN is unusual in that it sends projections to both ipsilateral and contralateral sides of the brain, unlike other brain structures that confine their innervations to either ipsilateral or contralateral. To understand the nature of these inputs, the current study focuses specifically on the inhibitory projections within the PPN-SNc synapse using electrophysiological methods and confocal microscopy. These projections have not been previously studied due to a lack of tools. The goal of this particular study is to investigate how hemisphere-specific inhibitory inputs differ in their synaptic strength.

Stereotaxic surgery is performed to deliver virus unilaterally to express a depolarizing light-gated ion channel, Channelrhodopsin (ChR2), which is tagged with a yellow fluorescent protein. Light-gated channels were activated to selectively depolarize PPN axons located in the input region that subsequently stimulates synapses onto dopamine neurons. Electrophysiological tests were then run to obtain electrical recordings that permit the quantification of inhibitory responses within the PPN-SNc pathway. Finally, brain slices were immunostained with antibodies to tyrosine hydroxylase, a precursor to dopamine, and to glutamic acid decarboxylase, a GABA-synthesizing enzyme, to visualize both dopaminergic neurons and GABAergic projections using confocal microscopy. Confocal images were collected in order to quantify the macroscopic distribution of any ipsilateral and contralateral inhibitory projections in the SNc.

While more data collection is needed, preliminary findings suggest that only the SNc ipsilateral to the injected PPN receives inhibitory inputs. Our research will permit greater clarity for future studies which seek to understand the underlying neural network and synaptic-level processes of the nigrostriatal dopaminergic pathway.

Funding Sources: Murchison Summer Research Fellowship, Biology Summer Research Fellowship, Trinity University Start-Up Funds, McNair Scholars Program, the Brain and Behavior Research Foundation NARSAD Young Investigator Award, and the Mary E. Groff Foundation

An Overview of Pacific Debate Institute

Nelson Rose*, Jean Masini*, Dr. Luis Martinez

This summer, we had the privilege of participating in Trinity's Stumberg summer accelerator, where we built the company known as Pacific Debate Institute (PDI). PDI seeks to provide remote debate educational services to middle and high school students throughout Asia, but focused in the United Arab Emirates. We applied to the Stumberg Venture Competition out of a passion for entrepreneurship, a love for debate, and the value we feel that starting our own business presents to students. As Stumberg finalists, we attended dozens of lectures by business experts, got the opportunity to network with experienced community members, professionals, and alumni, and, most crucially, the time to focus on our business as full-time employees.

In that time, we made strong progress on our goal of gaining ten or more customers by September 1st. Throughout June and July, we have met with three schools in the UAE to get feedback on our curriculum, market our services, and gauge interest in debate outside of the US. Outside of those sales meetings, we filed for a Limited Liability Corporation, developed a tailored curriculum for international debate education from scratch, decided on the best sales strategy for our business, and improved both financial and accounting skills through modeling our financial future and present. We feel much more confident in our all-around business futures due the instruction and practical experience gained from being Stumberg Finalists.

Funding sources: Stumberg Venture Competition

Determining the Effect of Amino Acid Changes on the Reduction Potential of the Rieske Protein from Thermus thermophilus

Devin Saenger*, Dr. Laura Hunsicker-Wang

The Rieske protein part of the Cytochrome bc_1 complex of the electron transport chain. It has a unique [2Fe-2S] cluster with two ligating histidines and two ligating cysteines. It is involved in the oxidation of ubiquinol during the Q cycle. Rieske proteins have reduction potentials that are sensitive to the cluster's environment and are dependent on pH. Mutations that alter the charges of residues in the protein can tune the reduction potential of the protein even when those mutations are distant from the cluster.

In order to understand the effect different amino acids have on the [2Fe-2S] cluster reduction potential, a series of mutations to the protein have been produced. One protein that will be characterized adds a hydrogen bond to the cluster and a positive charge next to the cluster. The others alter the charge state of the protein. These proteins will be characterized using several techniques including pH-dependent circular dichroism, UV-Visible spectroscopy, and capillary electrophoresis.

Funding Source: Trinity University Chemistry Department and the Welch Foundation

Cortisol Levels Across the Lifespan in Common Marmosets (Callithrix jacchus)

Amaya Seidl*, Matthew Lopez*, Dr. Kimberley A. Phillips*

Human aging is associated with senescence of the hypothalamic-pituitary-adrenal (HPA) axis, leading to progressive dysregulation characterized by increased cortisol exposure. This key hormone is implicated in the pathogenesis of many age-related diseases. Common marmosets display a wide spectrum of naturally-occurring age-related pathologies that compare similarly to humans, and are increasingly used as translational models of aging and age-related disease. Whether the marmoset HPA axis also shows senescence with increasing age is unknown.

We analyzed hair cortisol concentration (HCC) across the lifespan of 50 captive common marmosets via a cross-sectional design. Samples were processed and analyzed for cortisol using enzyme immunoassay. HCC ranged from 1,416 to 15,343 pg/mg and was negatively correlated with age. We found significant main effects of age group and sex on HCC, and no interaction effects. Infants had significantly higher levels of HCC compared to all other age groups. Females had higher HCC than males. These results suggest marmosets do not show dysregulation of the HPA axis with increasing age.

Funding: Semmes Distinguished Scholarship in Science Scholarship, NIH R01 AG064091, NIH P51 OD011133

Classification of Plant Exudates via Solution-State NMR Spectroscopy

Dana Sheehan*, Dr. Joseph Lambert

When exposed to high levels of stress or external damage, many plants will produce a sticky organic material known as an exudate. These exudates harden over time, creating a highly stable exudate that can even outlast the species it originates from. On the surface, these exudates often have seemingly similar physical appearances and properties. The exudates, however, can be classified into groups with distinct chemical structures and properties. Through a combination of analysis of solid state carbon-13 (13C) spectra, solution state one-dimensional proton (1D) spectra, and two-dimensional (gCOSY) spectra, over 14 molecularly distinct groups of exudates have been identified. This summer, the samples we are looked at were assorted resins (terpenoid organic compounds), ambers (fossilized resins), gums (polysaccharides), guaiacs (rosid exudates), and xanthics (xanthone derivative-containing compounds). Using the spectra obtained from these samples and the multitudes before them, we are able to compare structures across different taxonomies, geographical locations, and evolutionary backgrounds. In doing so, we are working to create a classification system of all plant exudates around the world.

Funding Source: Welch Foundation (Departmental Grant No. W-0031)

Pre Recorded Presentation

Civic Commitment in St. Louis: Rebuilding a City Through Educational Efforts

Molly Sheridan*, Dr. Jacob K. Tingle

This summer, I completed an internship in St. Louis, Missouri coordinated through Trinity's Arts, Letters, and Enterprise program. I worked with Trinity Alumni, Allison Hawk, at AHC Consulting LLC, her female-owned business. AHC is a certified Disadvantaged Business Enterprise (DBE) and Women's Business Enterprise (WBE) that provides strategic communication planning, organization-wide training, and facilitation services to a variety of clients. AHC only works with organizations that focus on bettering the St. Louis community through economic development, affordable housing, and education efforts. In alignment with the A.L.E. program, I was able to fully apply my liberal arts education, specifically relying on my Political Science, Business, and Global Health majors. My presentation will outline the skills, professional experience, and connections in the St. Louis area that I have gained during my internship.

One area in which I experienced immense skill development was through using my communicational and relational skills to ask questions in a professional environment. I was able to use my status as a current student to connect with organizations such as St. Louis University and St. Louis Community College. Most importantly, I used my extensive written and verbal communication skills to help with rebranding packages for clients, formulating press kits, and conducting industry-wide interviews. I had the opportunity to give recommendations to major actors within the education sector based on analytical and experiential research summarized by one-on-one meetings with teachers throughout the area. Ultimately, I experienced the importance of trust-building with clients and the notion that meaningful work can be done on a smaller-scale, sometimes having a larger effect. I gained a deeper understanding of the role that small businesses play in conducting community building and hope to nurture the connections and roots that I built this summer in St. Louis.

Funding Source: Arts, Letters, and Enterprise

Working in the Curatorial Department: Exhibition Preparation, Gallery Installation, Research, and Archives

Vanessa Silva*, Dr. Kathryn O'Rourke

This summer, I had the privilege of interning in the curatorial department of the San Antonio Museum of Art (SAMA). SAMA is a non-profit that serves the San Antonio community through preservation, exhibition, and education of artworks that encompass wide-ranging mediums, cultures, and time periods. During my internship, I conducted research, filed and gathered information from archives, prepared for the upcoming fall exhibition, shadowed gallery installations, and met with artists. I am very happy to be back at the Museum for a second year and have loved working with the curatorial team.

My time as curatorial intern was split between working in the contemporary and Latin American galleries. While working in the contemporary gallery, my work was research intensive. I organized and sourced information on over 70 artists in the Museum's collection from across the globe. This information was compiled into artist files that are used by the curator when researching, deciding which artworks to display, creating gallery labels, and choosing the Museum's next acquisitions. I also had the privilege of meeting with multiple living artists in their studios, both in-person and virtually. In the Latin American gallery, I worked on the Museum's archive project and shadowed gallery preparation. I focused on digitizing and sorting the curatorial records from the 1980s through 2000s. I also shadowed gallery installation for the reopening of a permanent gallery and exhibition preparation for the fall exhibition, *La Malinche*. This experience has been fulfilling and exciting.

In both galleries, I observed the curators conduct research, communicate with other departments, create gallery labels, decide on the pieces' locations and surroundings, and install the artworks. Additionally, I created social media posts that highlight pieces we currently have on display and include information on some of the artists I researched. I am grateful for the skills and relationships I have built while at SAMA!

Funding Source: Arts, Letters, and Enterprise program

Wherezy: Providing a Sense of Security for Parents

Clara Smartt*, Ellie Curran*, Matvei Popov*, Dr. Luis Martinez

Wherezy is a fun, customizable location tracking bracelet for young children, ages 2-12, which pairs to an app on their guardians phone. This allows for them to have access to their child's live location at all times, providing an extra sense of security regarding their child's safety.

In 2021, the FBI reported 337,195 children missing in the National Crime Information Center Database, and this drastic number does not even include children who are missing for short periods of time or who wander, all of which cause serious stress to their parents or guardians. Wherezy aims to solve this problem by providing parent's an extra sense of security with knowing their child's live location. As part of the Summer Accelerator Program, we dove deep into customer discovery interviews searching for market validation. We conducted many interviews, mostly with parents, using strategies from *The Mom Test*, where we tested and proved many assumptions, such as parent's concern for safety and privacy and their actual need for a solution. For the most part we received strong validation from parents regarding our assumption, but we also received helpful feedback that led us to further our market research. Due to some strong feedback and team consideration, toward the end of the summer we decided to look into selling business to business, to amusement parks or nursing homes, rather than selling directly to parents. As a whole, our skills and understanding of being an entrepreneur has grown. Through our manying networking events, our personal and professional network has grown extensively, and through the Accelerator as a whole, we not only made progress on our company, but learned a substantial amount about the business and entrepreneurial field as a whole.

Funding Source: Louis Herbert Stumberg New Venture Competition Endowment, F.W. Olin Fund for Entrepreneurship E-Team

Characterization of α-Keto Acids at the Air-Water Interface

Abigail Smith*, **Gia Campolo***, Dr. Rebecca Rapf

Organic molecules partition preferentially to air-water interfaces and form organic films in the natural environment, including on aerosols and the sea surface microlayer (SML). These films play a significant role in environmental reactivity, affecting how reactions occur in nature. Examining the phase behavior and surface characteristics of model surfactant species allows for a better understanding of interfacial reactivity, including interfacial photochemistry. Here we examine a series of surfactant molecules, investigating the role of head group as well as tail length on the phase behavior of monolayer films, including film stability, bulk pKa, and surface pKa.

Using a Langmuir trough, we will report on the phase behavior of a series of five similar insoluble surfactants composed of 18-20 carbon molecules, exploring how the phase behavior changes for a series of carboxylic acid derivatives, including isotherm compressions, hysteresis, and relaxation experiments. In addition, we are interested in characterizing the surface properties of a series of α-keto acids, ranging from 3-20 carbons. The bulk and surface pKas of various alkyl α-keto acids, including 2-oxobutyric acid and 2-oxovaleric acid, were measured. Additional measurements combined surface tension collection methods with pH probes to extract pH dependence on surface tension. By understanding these surface properties of α-keto acids, we will better understand how the interface may mediate observed chemistry.

Funding sources: Wandless Research Fellowship for Abby Smith and Trinity University Start-Up funds

Simplified Model of a Bacterium in Stokes Flow

Lisa Speegle*, Dr. Hoa Nguyen

Choanoflagellates are single cellular organisms that are the closest living relative to animals. They are critical in the study of multicellularity in animals as they can operate both alone or in a colony. One measure of their performance is the rate of bacterial capture by a single cell vs. by a colony. Before we can simulate the fluid-choanoflagellate-bacterium interactions to quantify this rate for different morphologies, our goal is to develop a simplified model of a bacterium without sacrificing important characteristics of its swimming patterns such as the rotation resulting from the helical flagella. While extending the 2022 work of Ishimoto et al. on a two-point representation, we also develop our own two-segment representation. In the two-point representation, the equal and opposite forces and torques are imposed at two points: the center of the cell body and the center of the flagellum. In the two segment model, on the other hand, the forces and torques are calculated along the sides of the cell body and flagellum. The latter model should be more accurate to characterize the fluid flow near the bacterium model as we compare the streamlines from these simplified models with the model that fully discretizes the cell body and the flagellum. Once we have a good representation of a bacterium, we can couple the model with the choanoflagellate-fluid system to simulate the feeding rate of a single cell vs. that of a colony.

Funding sources: NSF DMS-2054259 and NSF MRI-ACI-1531594

Testing Noun and Verb Learning with the Same Stimuli: Does Context Matter?

Piper Swearengin*, Zoe Baker*, and Dr. Jane Childers

Learning a new verb can be more difficult than learning a noun given the complexity of identifying the verb's referent (Bornstein et al., 2004; Hespos, Saylor, & Grossman, 2009; Childers & Tomasello, 2002). However, most studies of nouns and verbs use different stimuli and procedures, making them difficult to compare (but see Childers & Tomasello, 2002; Childers et al., 2012). The present study examines noun and verb learning, but further asks whether the context in which a word is learned affects learning. There is evidence that context may not be important in noun learning (Tippenhauer & Saylor, 2018) though given the difficulty of learning new verbs, context may play a larger role in verb learning. Our study compares noun and verb learning using the same visual stimuli for nouns and verbs in learning trials and at test. Two-, 3-, and 4-year-old children (n=41 to date) learned four novel words, either nouns or verbs, and were tested using the same context or a different context. Overall, we predict the results will show that context plays a more significant role in verb learning than noun learning, suggesting that learning a novel verb in the same context would lead to improved retention.

Funding Source: Murchison Fellowship

Wavelength dependent Photochemistry of Bulk Phase Polycyclic Aromatic Hydrocarbons

Denver Talley*, **Tim Mose***, Dr. Rebecca Rapf

Much of Earth's chemical complexity is due to sunlight acting as a driving force for photochemical reactions. High energy UV light, an important component of the solar spectrum, is often considered in the context of the degradation of organic molecules, but it can also provide energy that results in the formation of chemical complexity and the production of organic aerosols. It has been suggested that photochemistry of organic molecules in films at the air-water interfaces may be a key contributor to the chemical processing of organics in remote environments. Polycyclic aromatic hydrocarbons (PAHs) are key pollutant molecules which undergo photochemical degradation. The photochemical properties of PAHs are highly sensitive to reaction environment, including changes at air-water interfaces, making them an interesting model species to examine interfacial photochemistry, Here, we report on the the photochemical reactions of different PAHs. PAHs are molecules that have two or more aromatic rings and consist of derivatives with different functional groups. Specifically, we have focused on pyrene with four aromatic rings, anthracene with three aromatic rings, and pyrene carboxaldehyde (PCA), an aldehyde derivative of pyrene. PAHs can undergo radical photochemistry and interact with the surrounding environment, whether that be oxygen to form oxygenated products or other organic molecules (like alkanes) to form new carbon-carbon bonds. We will discuss he photolysis of bulk solutions of pyrene, anthracene, and PCA and the analysis of products electrospray ionization mass spectrometry and UV-Vis spectroscopy. The bulk phase reacitivty was characterized to provide a comparison for interfacial PAH behavior.

Funding Source: Welch Foundation Departmental Grant

The Many Hats of a Nonprofit: My Internship with YOSA

Corrinne Tallman*, Dr. Carl Leafstedt

This summer, I had the privilege of working as an intern with the Youth Orchestras of San Antonio. YOSA is a nonprofit organization that provides young musicians of all backgrounds opportunities to play music in order to improve their skill and connect with the community. They do this by hosting programs during the school year and summer that give students a chance to learn in an engaging and challenging environment. YOSA provides as much tuition assistance as possible to families in need to fight systemic inequality and diversify classical music in San Antonio. I helped this cause in a variety of ways by working with the Development, Operations, and Marketing departments at YOSA.

Because nonprofits often have a limited full-time staff, each member of the team must play different roles within the organization. Though my official position was within the development department at YOSA, I consistently helped in other areas. This diversity of tasks helped me build a repertoire of skills required to run an organization. I improved my verbal and written communication skills by answering phone calls and emails, most of which required rapid, concise thinking and an in-depth understanding of the company. This also developed my customer service skills, which will no doubt be useful to me in my future career as a music educator. I also practiced design and marketing skills by working with YOSA's marketing team to brainstorm imaging for the upcoming season, which included creating poster mock-ups, merchandising options, and social media management. Of course, I was also given tasks that though simple and seemingly mundane, turned out to be vital to the inner workings of the organization. I have no doubt that this experience of playing different roles during my internship with YOSA will directly translate to my experience as a music educator.

Funding Source: Arts, Letters, and Enterprise

Environments and Timing of Dolomitization and Carbonate Diagenesis in the Triassic Yangtze Platform of the Nanpanjiang Basin, South China

Josephine Tesauro*, Nathaniel Ledbetter Ferrill*, Dr. Daniel Lehrmann

The Yangtze Platform contains a dolomitized interior, undolomitized margin, and partially dolomitized slope. Dolomite replaces micrite, carbonate grains, and early cement. Vugs and fractures are filled with saddle dolomite, while later fractures are filled with calcite.

Dolomite stable isotope values comprise $\delta^{18}O$ -7.7 - 0.8‰ (VPDB) and $\delta^{13}C$ 0.77 - 4.0‰ (VPDB). Vein calcite values show $\delta^{18}O$ -18.4 to -5.2‰ and $\delta^{13}C$ -6.1 to 3.4‰. $^{87}Sr/^{86}Sr$ values from 14 dolomite samples range from 0.707677 to 0.708601, consistent with Early to Middle Triassic seawater values, excluding elevated $^{87}Sr/^{86}Sr$ in 3 samples.

Average homogenization temperatures (T_h) and freezing point depressions (Tm_{ice}) from 10 primary fluid inclusion assemblages from individual dolomite crystals in the platform interior and slope indicate entrapment of saline brines (9.5 to 15 wt. % NaCl) over temperatures of 113-150°C. Carbonate clumped isotope (Δ_{47}) measurements yielded temperatures in dolomite of 93-185°C, whereas calcite vein fill measurements yielded temperatures of 94-98°C.

Elemental and isotope data was gathered using LA-ICPMS. Replacement dolomite with elevated U and low Th (0.2 ppm) produced a well-constrained $U^{238}/^{206}Pb$ date of 139.28 ± 4.21 Ma. REE signatures show a negative Ce anomaly consistent with the signature of seawater, suggesting dolomitization occurred in a rock-dominated system. Another replacement dolomite sample with higher Th (1.1 ppm) yielded a less-constrained age of 197.6 ± 23.4 Ma. Calcite fracture fills yielded well-constrained $^{238}U/^{206}Pb$ dates of 25.81 ± 13.58 Ma and 58.67 ± 6.6 Ma.

Results indicate replacement dolomitization occurred during Jurassic to Cretaceous burial at temperatures of 90-185°C. The spatial distribution of dolomite indicates marine cementation of the margin prevented permeation of dolomitizing fluids. Spatial variability of dolomite temperatures indicates localized invasion of hydrothermal fluids along faults and fractures. Age dates and lower temperature geothermometry of calcite phases are consistent with Neogene uplift.

Funding Source: National Science Foundation

DisABILITYsa - My Summer Interning For A Great Cause

Eduard Thompson* and Dr. Carl Leafstedt

This summer I had the opportunity to intern at a local San Antonio non-profit named DisABILITYsa. DisABILITYsa is an organization whose mission is to make San Antonio the #1 city for people with disabilities to live, work, learn, and play. Throughout my time with the organization, I have had the opportunity to fully immerse myself into a culture which truly values the importance of ensuring that San Antonio's disabled community thrives. Not only does this organization ensure that there are opportunities for people with disabilities to have access to educational resources and engagement opportunities, but, they help make sure the community is strengthened and has opportunities to grow as individuals.

My role in the organization this summer was as a Community Advancement intern. According to the job description, I was tasked this summer with civic engagement, community education, and research. My true experience transcends this simple definition, however. This summer I had the opportunity to fully immerse myself into my role and become passionate about the work I was doing and the community I was serving. Through tasks such as writing policy proposals, engaging with community event calendars and websites, as well as consistently meeting with city leaders and community innovators, I was able to learn a lot about what it means to serve a mission greater than any individual and instead serve a community which has oftentimes been far too neglected.

Funding Source: ALE

Bacterial Motor Mechanics

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

Many flagellated bacteria, including *Pseudomonas aeruginosa,* achieve motility by using their flagellar motors to generate a torque that propels the 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 are able to track the amino acid substitutions that occur in each generation as the stator unit reaches its most efficient structure.

The preliminary stages of this study focused on developing techniques to facilitate motility measurement extraction. We investigated the fluorescent properties of different bacterial strains to find the optimal fluorescence intensity and rate of photobleaching for imaging with total internal fluorescence microscopy. From there, we worked to optimize the automated tracking and modeling MATLAB code by decreasing the runtime to microseconds while comparing it to longer runtimes from previous tracking algorithms. In parallel, we focused on developing a standard procedure for preparing supported colloidal surfaces to use in future bacterial imagining as a biomimetic surface. Future work will focus on extracting motility measurements over biomimetic surfaces that we will then input to a computational fluid dynamics model to find the protein residues essential to the flagellar motor's efficiency.

Funding Source: Murchison Summer Research Fellowship

Figurative Language in The Iliad

William Turner*, Dr. Erwin Cook

Homer's *Iliad* is an orally composed epic, which, rather than being the work of a single author, is the product of generations of oral performance. This summer, I have been working with Dr. Cook on the use of figurative language in *The Iliad*. While the study of Homer has a long and prolific history, figurative language in Homer has been comparatively neglected. This work has required the cataloging and analysis of every instance of figurative language in *The Iliad.* Of the figurative language in *The Iliad*, similes are by far the most prolific and the most studied. Iliadic similes are one of the memorable aspects of the epic. However, the similes exist not only to provide description but also to provide entertainment; one of the most important aspects of Iliadic similes is to break the monotony of the more repetitive sequences in *The Iliad.* While similes are frequent and often quite long, there are much fewer significant metaphors—a surprising share of which belong to an angered Hector. More than a few of them seem to rely on cultural knowledge, which is no longer available, such as Hector's reference to "the bowl of freedom." The end goal of this project is to assist in the completion of Dr. Cook's *Iliad* commentary.

Funding Source: Mellon Initiative

Investigating Baboon Immunity to SIV Infection

Catie Vaccaro*, Emma Mask, Jessica Callery, Dr. Luis Giavedoni

SIV is a retrovirus isolated from several African non-human primates (NHP) that is genetically similar to HIV in humans. Natural host species of NHP, such as the sooty mangabeys or African green monkeys, evolved with the virus and do not show pathogenesis from it. Non- natural hosts, such as the Asian rhesus macaque, do experience pathogenesis from SIV and with time develop into having simian AIDS. However, there is one outlier species of African non- natural hosts, the olive baboon, which is not naturally infected with SIV yet does not show any form of pathogenesis from infection with SIV. Our laboratory has been exploring the baboon as an animal model to study elite controllers (EC), the very small percentage (less than 0.5%) of HIV-infected humans that can control infection in the absence of any antiretroviral therapy.

To identify cells involved in control of SIV infection, an experiment was done in which one cohort of baboons had their CD8+ cells transiently removed by an antibody, while a second cohort was treated with an irrelevant antibody. These two cohorts were then infected with SIV, and blood and lymph node samples were taken at different time periods. Single cell RNA sequencing (scRNAseq) identifies the RNA transcripts found within one cell and can help show the effects certain diseases have on cells, which cells are targeted by an infection, and what genes must be upregulated or downregulated to elicit pathogenesis or control the infection.

We have been working in refining the analysis of the large sequencing data set provided by scRNAseq, and in improving the SIV detection molecular assays. Results from our efforts are expected to assist in the identification of mechanisms of SIV control present in baboons and in human elite controllers.

Funding Source: Brackenridge Endowment

The Effects of Oxytocin on Dopaminergic Neurons

Carmine Villarreal, Kah-Chung Leong, and Dr. Gerard M. J. Beaudoin, III

The neuropeptide oxytocin has an ability to affect dopaminergic neurons in various regions in the brain. Oxytocin is released during social bonding and has been observed in rats to curb the use of cocaine. Data from Dr. Leong's lab has shown behavioral effects of oxytocin on drug seeking behavior in rats. We are using whole-cell electrophysiological recordings of miniature excitatory and inhibitory postsynaptic currents on dopamine neurons in the ventral tegmental area (VTA) to assess the effects of oxytocin on the strength of inputs to dopamine neurons. Since the experiment seeks to observe miniature excitatory and inhibitory postsynaptic currents, the neurotoxin tetrodotoxin (TTX) was applied to block sodium channels and thus inhibit the spontaneous firing of action potentials. Excitatory and inhibitory synaptic responses were isolated in individual experiments through the use of antagonists to receptors for glutamate and GABA. The application of these antagonists allows for the electrophysiological collection of miniature postsynaptic currents which are generated from a presynaptic terminal in the absence of an action potential, due to stochastic fusion of one synaptic vesicle. Results were obtained for a baseline, with oxytocin washed in, and lastly with an oxytocin receptor antagonist, each at 5 minute intervals. Our results will establish the effects of oxytocin on regulating the strength of excitatory and inhibitory inputs to dopamine neurons of the VTA, which may underlie the reduced drive for cocaine seeking.

Funding Source: McNair Scholars Program, the Brain and Behavior Research Foundation NARSAD Young Investigator Award, and the Mary E. Groff Foundation

Variability in Hair Cortisol Concentration Among Adult Baboons

Ashwini Vivek*, **Amaya Seidl**, **Marco Boisselier**, Dr. Kimberley A. Phillips

In humans and chimpanzees, degeneration of the hypothalamic-pituitary-adrenal axis (HPA), a process which releases increased amounts of cortisol as it progresses, is linked to aging. Cortisol is a glucocorticoid hormone involved in the regulation of chronic and acute stress responses, metabolism, and immune system activity. Hormones such as cortisol can be detected in blood, saliva, urine, feces, and hair. Hair cortisol concentration (HCC) provides a retrospective long-term measure of HPA axis activity and is non-invasive. Understanding how cortisol varies with age could provide important information regarding age-related changes in the HPA axis. Baboons (*Papio hamadryas anubis*) are non-human primates used to investigate complex diseases – such as heart disease, diabetes, and osteoarthritis – that manifest similarly in humans. Baboons therefore have potential as a model for understanding age-related changes, specifically in the HPA axis. We researched HCC levels in 38 adult baboons (19 male, 19 female) ranging in age from 7-17 years. Samples were processed and analyzed for cortisol using an ELISA assay which we have validated in our lab. Hair cortisol values ranged from 21.24 to 134.49 pg/mg, falling within the HCC range reported in similar studies on this species. We found no significant differences between male and female HCC levels, nor in HCC levels across age, differing from other studies. These results are potentially due to the small sample size and limited age range used in the current study. The results suggest high variability in HCC levels among adult baboons that warrants further investigation, such as in relationship with social status or group dynamics.

Funding Source: Semmes Distinguished Scholars in Science Scholarship, Trinity Neuroscience Program

The Portrayal of Mothers in Ovid's *Metamorphoses*

Savannah Wahlgren*, Dr. Tim O'Sullivan

Ovid's *Metamorphoses* is an epic poem consisting of numerous myths and legends, connected by the theme of metamorphosis of the body. A large portion of the poem contains stories of motherhood, through which Ovid transports his audience, mostly elite men, to places only known by women, through stories about a metamorphosis only experienced by women. Despite the plethora of scholarship on the treatment of gender in the *Metamorphoses*, there is surprisingly little work on motherhood specifically. This project aimed to help to fill this gap by collecting and analyzing the portrayal of motherhood in this text. After initial research, we narrowed our focus to how Ovid portrays the complexities of maternal identity. Ovid is known for his masterful use of the Latin language; no word is used without careful consideration. Ovid uses this same care with the title of *mater*, the Latin word for mother, to convey the complexity of that identity. In passages with an extended focus on motherhood, Ovid uses *mater* to emphasize a woman's connection to her identity as a mother. The switch between the use of a woman's given name and *mater* consistently occurs at narratively significant places in the story when a woman identifies with, or fails to identify with, the title of *mater* and all its responsibilities. Ovid also uses *mater* to illustrate consequences that come from taking on this title, including the gains of community with fellow mothers and the loss of personal agency and identity. Our research has culminated in a catalog of references to motherhood within the text and a paper on Ovid's portrayal of maternal identity in the *Metamorphoses*. This research will inform Dr. O'Sullivan's book project on metaphors of change in the Augustan era and Savannah Wahlgren's honors thesis on the depiction of motherhood in Ovid's poetry more broadly.

Funding Source: Mellon Initiative

Re-imagining Auschwitz in Graphic Narratives

Madeleine West*, Dr. Victoria Aarons

The medium of graphic novels has largely been underestimated in the landscape of art and literature. Yet, the metaphysics of graphic novels yields itself to depict atrocity in ways that traditional art cannot through the intersection of temporal linearity and spatial boundaries. Comics such as Bernie Krigstein's 1955 "Master Race" depicted the atrocities of the Holocaust while excluding the identity of its victims, but the creation of graphic novels as a genre of Holocaust representation and the specific reference to a Nazi death camp would emerge decades after "Master Race" with Art Spiegelman's *Maus,* the graphic novel depicting his father's memories of Auschwitz in the past while simultaneously visualizing how these traumatic memories of the Holocaust continue to linger in the present and in large part shape the future for the descendants of survivors. *Maus* inspired other second-generation survivors to depict their stories, through the medium of comics, of the influence of parent(s) who survived Auschwitz. These artists use differing artistic and textual styles and have varying reasoning for wanting to depict their parent's stories, yet they all evoke postmemory in showing the intergenerational memory of the Holocaust. The continuation of artists using the graphic novel medium to depict Auschwitz, a medium where time and space merge, has influenced the way we remember and understand the site where trauma and inhumanity still remain in the memory of survivors and their descendants. Our research project examines the representation of Auschwitz in graphic novels in order to contribute a chapter to the *Routledge Handbook of Auschwitz-Birkenau,* a collection of essays designed to contribute to a shared understanding of the role of Auschwitz-Birkenau in the implementation of genocide and the continuing legacy of the Holocaust.

Funding Source: Mellon Initiative

Summer Internship: Building Community at the Carver Community Cultural Center

Cass Williams*, Dr. Jacob K. Tingle

This summer, I had the privilege of interning at the Carver Community Cultural Center, also known as the Carver. While the Carver holds so much historical value in the city of San Antonio, not many people know about it. Located on the city's east side, the Carver was the first library for African Americans during segregation, and has over time turned into a place of performing arts.Established nearly a century ago, the Carver has helped build a sense of community in the San Antonio area, and that is something that I wanted to focus on during my time as an intern. I applied to this internship through the Arts, Letters, and Enterprise program at Trinity University, and this program has provided me with an incredible experience to be creative in terms of both marketing and event planning, which helps in my goal to recreate the community presence the Carver previously held so many years ago.

As an intern at the Carver, I was encouraged to use my creativity to create graphics and develop ideas that would pique the interest of those who reside in the greater San Antonio area. As of recently, the Carver's audience consisted mostly of older citizens, and my goal was to expand that audience in order to broaden the Carver's social and artistic impact. During the experience, I quickly developed skills in marketing and communication. I attended meetings with community members, as well as other city employees; doing so, gave me a real understanding of how direct and specific communication is imperative in order to turn ideas into actions As an organization affiliated with the city, I witnessed firsthand the solidarity that city organizations have with one another, as they keep the same goal in mind: to build community and a sense of security within the citizens of San Antonio. During my time at the Carver, I've learned and felt a sense of pride as I realized that with every task, whether big or small, all contributes to bettering the community.

Funding Source: Arts, Letters, and Enterprise

The Importance of Women: A Look Into Haudenosaunee Women's Roles in Politics

Ever Whitlock*, Dr. Erin Kramer

In this project, I researched Haudenosaunee political life and the role that women played in it in the seventeenth and eighteenth centuries. Women in Haudenosaunee society were (and still are) very important figures and in charge of a multitude of different aspects of Haudenosaunee life. They participated in political events, both internal and external, but their roles are still not well understood by historians, partially because of patriarchal views of Indigenous life recorded in colonial documents. Working with Dr. Kramer, I focused on primary documents and secondary sources that refer to women's political participation. Primary sources included diplomatic council minutes collected in a database built during SURF 2021 as well as colonial observations of Haudenosaunee women. In addition, I consulted Haudenosaunee oral histories such as Creation and the Great Law of Peace. With this research, I have realized the importance of looking at primary sources through different lenses and that the power women held needs to be acknowledged and made known.

Funding Source: Mellon Initiative

From Lede to Layout: My Journey Into the World of Journalism

Caroline Wolff*, Dr. Alicia Guerrero

This summer, I had the privilege of completing a dual internship with the San Antonio Current and the Trinitonian. As a Communication major who has served as a copy editor and contributor for campus publications such as Skyline Magazine and The Trinity Review, I've developed a strong interest in journalism during my time at Trinity. I came into this internship with the goal of learning what a career in journalism entails and developing the skills necessary to succeed in the profession. In both of my roles this summer, I prioritized building relationships with fellow journalists on a foundation of collaboration and mutual respect.

Most of my time each week was spent working at the San Antonio Current, where I took on an eclectic range of duties, some familiar—like annotating press releases and writing articles—and some new—like compiling and sourcing slideshow images and approving events for the Current's online calendar. As an Arts & Culture reporter, I had the life-changing opportunity to further immerse myself in the San Antonio community and its rich cultural heritage. I'm grateful to my supervisor, Kelly Merka Nelson, for her patient and thorough guidance over the past two months.

Each week, I devoted one day (Wednesday) to my work on the Trinitonian's *Declassified* issue, a guide to life at Trinity for incoming first-years and transfer students. Although I've worked on various campus publications, I had never served in a lead editorial position until this summer. I was initially nervous to take on such a big leadership role but soon found that, with the help of my faculty advisor Alicia Guerrero and my small but mighty staff, I was ready to rise to the challenge. Working on the *Declassified,* I performed a plethora of duties and learned several new skills, most notably constructing page layouts using Adobe InDesign.

Funding: Arts, Letters, and Enterprise

Towards a Scholarly Edition of the Religious Writings of Harriet Beecher Stowe

Dean Zach*, Dr. Claudia Stokes

Although she is primarily known to present-day readers for her 1852 novel *Uncle Tom's Cabin*, Harriet Beecher Stowe produced a massive body of work over the course of her life, including popular novels, short stories, and articles for prominent periodicals such as *The Christian Union* and *New York Evangelist*. All of Stowe's written work will be collected in a forthcoming 33-volume scholarly edition from Oxford University Press.

In 1874, Stowe published *Woman in Sacred History*, a compilation of her biographical sketches of notable Biblical women, many of which were published in *The Christian Union* from 1873-74. In this project, I research the background of *Woman in Sacred History*, including its publication history, its placement in the larger genres of Biblical interpretation and the art book, and the influence of Calvin Stowe, Harriet's husband. I then transcribe and collate *Woman in Sacred History*, digitizing and comparing its various editions. I also document the changes Stowe made to Bible verses and prepare potential annotations to be used in the apparatus of the scholarly edition.

Ultimately, my research contributes to the volume on *Woman in Sacred History* which will be edited by Dr. Claudia Stokes and included in *The Collected Works of Harriet Beecher Stowe*, the Oxford University Press scholarly edition. Publishing this volume will correct a historical oversight in the scholarship on 19th century American literature. It will also exhibit the ways in which Stowe sought to elevate women to the status of powerful scriptural authority figures and breathe new life into the Bible, demonstrating the Bible's enduring relevance for contemporary issues in American society.

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Servicing the Invisible: An Enabling Experience at disABILITYsa

Sirui (Lexi) Zhang*, Dr. Carl Leafstedt

This is the last summer before I graduate from Trinity, and I am grateful for the opportunity to work as a community advancement and research intern at disABILITYsa. It is a nonprofit organization functioning as a resource hub that serves people with disabilities in San Antonio area by connecting people to pertinent sources. DisABILITYsa's main principles are to educate everyone on disability, advance people's knowledge on the matter, engage participation, as well as strengthen services to people with disabilities. The organization is highly active in the community in that it hosts various events to fulfill the key principles. One can also find DisABILITYsa's presence in many events hosted by other organizations.

My experience as a community advancement and research intern allowed me to take a glimpse into the world of disability advocacy, which undoubtedly offers key insights into the general advocacy and nonprofit world. The advancement and research aspects go hand in hand. In other words, I conduct research with the purpose to help people understand more about disability and marginalization. I attended meetings for two projects on a regular basis: Successfully Aging and Living in San Antonio (SALSA) Visitability Housing, and SALSA Housing Advocacy. Both projects offer people with disabilities and/or of older age more viable housing options. I was tasked with finding relevant information and data, watching city council meeting recordings, asset mapping, create spreadsheets for collaboration and cataloging and more. Another project I have taken on deals with mobile changing units for adults. For that project I attended the Inclusion Programming event at Hemisfair Park, where I handed out surveys, and researched sources within and outside of disABILITYsa's database. Research and community advancement are the two defining aspects of my time at disABILITYsa.

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