Office of Student Research

APPALACHIAN STATE UNIVERSITY

Welcome to the 2018 Annual Celebration of Student Research and Creative Endeavors sponsored by the Office of Student Research. The Office of Student Research (OSR) was established in 2005 in order to expand the opportunities for undergraduate and graduate students to engage in research and mentored scholarship at Appalachian State University. We firmly believe that students who understand how discoveries are made in their chosen fields are well-prepared to address the unsolved problems of the future. We are so pleased to host this annual event.

Today marks our 21st year of celebrating student engagement in research and creative endeavors. It also includes our 9th annual student poster competition. The poster competition has rapidly become a highlight of our event. In fact, this year we had over 110 entrants in the competition from which the top 10 undergraduate and graduate student abstracts were selected and asked to present to a panel of faculty judges today from 10:00-11:00am. The top 3 posters in each category will be announced during our remarks at 1:15pm. Additionally, we acknowledge a lot of this work could not be done without the support of the faculty as the definition of student research is student-faculty collaboration. Thus, today we will also announce during our remarks the winner of our 2nd Annual Undergraduate Research Mentorship Excellence Award.

During today's event I invite you to engage with the students that are presenting, learn about the amazing activities occurring across campus and celebrate the advancements these students have made with their research or creative endeavor. Please thank a faculty member for their time and effort in assisting the students in their work.

The Office of Student Research is proud to assist students and faculty in their efforts to engage in research and creative endeavors but could not do that without support from the following areas: Office of Academic Affairs, Office of Student Affairs, Cratis D. Williams Graduate School, Office of International Education and Development, Office of the Quality Enhancement Plan, and University College. Finally, a special thank you to the Advisory Board of the Office of Student Research, the faculty reviewers and moderators for today's event and to the staff in the Office of Student Research which include Kathy Weaver Stevens, Mitzi Triplett and our graduate Assistants, Denzel Dejournette and Zach Leicht.

Rebecca A. Battista, Ph.D., FACSM
Interim Director, Office of Student Research

Office of Student Research

APPALACHIAN STATE UNIVERSITY

21st Annual Celebration of

Student Research and Creative Endeavors

Thursday, April 19, 2018

Plemmons Student Union

The Office of Student Research would like to thank our past and present OSR Advisory Board members for serving in this capacity.

Founding Advisory Board Members – Office of Student Research

(established 2005)

- **Dr. George Barthalmus,** *North Carolina State University*
- **Dr. Nicole Bennett,** *Department of Chemistry*
- **Ms. Shari Galiardi,** *Service Learning*
- **Mr. David Huntley,** *Watauga Global Communities*
- **Dr. Bob Johnson,** *Cratis D. Williams Graduate School*
- **Dr. Lisa McAnulty,** *Department of Family & Consumer Sciences*
- **Dr. Jeff McBride,** *Department of Health, Leisure, and Exercise Science*
- **Dr. Ozzie Ostwalt,** *Department of Philosophy & Religion*
- **Mr. Jay Sutton,** *Department of Athletics*
- **Dr. Rahman Tashakkori,** *Department of Computer Science*
- **Ms. Cindy Wallace,** *Division of Student Development*
- **Dr. Mark Zrull,** *Department of Psychology*

Current Advisory Board Members – Office of Student Research

- **Dr. Dan Caton,** *Department of Physic and Astronomy*
- **Dr. Brooke Christian,** *Department of Chemistry*
- **Dr. Heather Dixon-Fowler,** *Department of Management*
- **Dr. Jeremy Ferrell,** *Department of Sustainable Technology and the Built Environment*
- **Dr. April Flanders,** *Department of Art*
- **Dr. Amy Galloway,** *Department of Psychology*
- **Dr. Jennifer Geib,** *Department of Biology*
- **Dr. Hessam Ghamari,** *Department of Applied Design*
- **Dr. Cathy Marcum,** *Department of Government and Justice Studies*
- **Dr. Scott Marshall,** *Department of Geological and Environmental Sciences*
- **Dr. Kim McCullough,** *Department of Communication Sciences and Disorders*
- **Dr. Jennifer McGee,** *Department of Curriculum and Instruction*
- **Dr. Suzi Mills,** *School of Music*
- **Dr. Mark Zrull,** *Department of Psychology*
- **Dr. Kevin Zwetsloot,** *Department of Health and Exercise Science*

9th Annual Student Research Poster Competition

Overview: The Office of Student Research is pleased to again feature our 9th Annual Student Research Poster Competition. This competition includes both undergraduate and graduate categories. Each student presenter had an option to submit their abstract for consideration in the competition. A total of 111 posters: 68 undergraduate and 43 graduate posters were submitted into the competition. From these a panel of judges determined the top 10 finalists for each category (finalists are listed below).

From 10:00-11:00 am each student will make a 3-5 minute presentation and answer questions from the judges regarding their poster. The posters will be evaluated on the following categories: background/rationale, methods or approach to the question, concluding statements/findings, student's level of leadership/involvement in the project, student's overall understanding of the project/creative endeavor, student's ability to answer questions on the project and poster appearance.

Finalists for the Undergraduate Student Research Poster Competition

Student	Faculty Mentor	Title
Morgan Baker	Dr. Gabriele Casale *Department of Geological and Environmental Sciences*	DETERMINING THE ANNEALING CURVE OF RADIATION HALOS IN QUARTZ GRAINS THROUGH HEALING EXPERIMENTS
Danielle Boase	Dr. Maggie Sugg *Department of Geography and Planning*	WEARABLE SENSORS FOR CONTINUOUS PREGNANCY HEALTH AND ENVIRONMENTAL MONITORING: FROM A PATIENT AND PROVIDER PERSPECTIVE
Kevin Bynum	Dr. Cynthia Liutkus-Pierce *Department of Geological and Environmental Sciences*	ANCIENT SOILS AND THEIR ROLE IN RECONSTRUCTING PALEOCLIMATE: STRATIGRAPHIC INTERPRETATION AND BULK GEOCHEMICAL ANALYSIS OF A MIOCENE FOSSIL SITE IN KENYA
Jacob Dorsett	Dr. Scott Marshall *Department of Geological and Environmental Sciences*	WHERE IS THE SOUTHERN END OF THE SAN ANDREAS FAULT? A PHYSICS-BASED MODELING STUDY
Charleston Gaillard	Dr. Kevin Zwetsloot *Department of Health and Exercise Science*	EXERCISE CHARACTERISTICS IN MANGANESE SUPEROXIDE DISMUTASE OVEREXPRESSING MICE
Allison Griggs	Dr. Cara Fiore *Department of Biology*	FRESHWATER SPONGES ARE PREVALENT IN WESTERN NORTH CAROLINA AND HOST DIVERSE MICROBIAL SYSTEMS
William Johnson	Dr. Kevin Zwetsloot *Department of Health and Exercise Science*	INFLUENCE OF 20-HYDROXYECDYSONE ON SKELETAL MUSCLE MONOCYTE INFILTRATION FOLLOWING ECCENTRIC DAMAGE
Carmen Montero	Dr. Darren Seals *Department of Biology*	A SMALL-SCALE SCREEN OF NUTRACEUTICAL COMPOUNDS THAT AFFECT THE INVASIVE PROPERTIES OF CANCER CELLS
Maggie Smith	Dr. Michael Opata *Department of Biology*	SPLENOCYTES FROM YOUNG MICE PROTECT IMMUNOCOMPRISED MICE AGAINST DEATH FROM MALARIA INFECTION, BUT THEY DO NOT PROLIFERATE WELL
Emma Taylor	Dr. Abigail Stickford *Department of Health and Exercise Science*	HEALTH BEHAVIORS AND BELIEFS AMOUNG PREGNANT WOMEN IN RURAL COMMUNITIES

Finalists for the Graduate Student Research Poster Competition

Student	Faculty Mentor	Title
Lauren Anderson	Dr. Maggie Sugg *Department of Geography and Planning*	AN ASSESSMENT OF WILDFIRE VULNERABILITY IN WESTERN NORTH CAROLINA, USA FOLLOWING THE 2016 WILDFIRES
Elizabeth Bailey	Dr. Maggie Sugg *Department of Geography and Planning*	CLIMATE AND CONFLICT INTERACTIONS: THE RELATIONSHIP BETWEEN CONFLICT SPIKES AND CLIMATE DEVIATIONS IN NORTHERN LATIN AMERICA
Kathryn Farina	Dr. Herman van Werkhoven *Department of Health and Exercise Science*	DOES FOOT STRIKE PATTERN CHANGE DURING A MAXIMAL 800-METER RUN?
Heather Guy	Dr. Baker Perry *Department of Geography and Planning*	SUBSEASONAL VARIATIONS OF STABLE WATER ISOTOPES IN TROPICAL ANDEAN PRECIPITATION
John Mackall	Dr. Alan Needle *Department of Health and Exercise Science*	THE EFFECTS OF ECCENTRIC MUSCLE DAMAGE ON NEURAL INHIBITION
Jessica McCanless	Dr. Maryam Ahmed *Department of Biology*	MODULATION OF THE BREAST CANCER TUMOR MICROENVIRONMENT BY ONCOLYTIC VESICULAR STOMATITIS VIRUS
Haley McGuirt	Dr. Andrew Bellemer *Department of Biology*	THE ROLE OF TRANSLATIONAL REGULATION BY TOR AND LK6 IN PAIN SENSITIVITY
Wilton Norris	Dr. Herman van Werkhoven *Department of Health and Exercise Science*	pQCT AS AN ALTERNATIVE TO MRI TO QUANTIFY 3D BONE GEOMETRY - A FEASIBILITY STUDY
Elaine Wartinger	Dr. Laura McArthur *Department of Nutrition and Healthcare Management*	PREVALENCE AND CORRELATES OF FAMILY AND CAMPUS FOOD INSECURITY AMONG FRESHMAN AT A UNIVERSITY IN APPALACHIA
Adam Willits	Dr. Andrew Bellemer *Department of Biology*	THE ROLES OF CELLULAR SIGNALING PATHWAYS IN REGULATING NOCICEPTIVE BEHAVIOR IN DROSOPHILA

The top 3 posters for each category (undergraduate and graduate) will be determined and an awards ceremony will take place at 1:15 pm following our general remarks.

Funding for the awards was provided by the Office of Student Research and the Cratis D. Williams Graduate School.

2018 Aportfolio Scholars "Chancellor's Choice" Award

This award honors and acknowledges an Appalachian State University student who develops an outstanding, creative, scholarly, and professional Aportfolio. The winner of this award is selected as an exemplar and their ePortfolio will be added to the Aportfolio site in our top tier directory.

Aportfolios Students applying for the award were challenged to create an ePortfolio that shows awareness of profession audiences, uses intentional visual design, creates an invitational and intuitive navigational structure, honors the privacy, intellectual property and copyrights of self and others, creates clear connections to learning and life experience and highlights samples from a variety of their best work by summarizing the impact, insights and integration of college learning and experiences

The 2018 Aportfolio Scholar winner is

Jessica Castillo

Honorable Mention

Devon Suggs
Christine Perry

Undergraduate Research Mentorship Excellence Award

The Office of Student Research invites nominations each spring for the Undergraduate Research Mentorship Excellence Award. Only in its second year, this award has seen overs 60 students nominate over 30 faculty from various disciplines. This award recognizes faculty members who have demonstrated an outstanding commitment to mentoring undergraduate student researchers as well as supporting and promoting the undergraduate research initiatives on campus.

Students were asked to nominate faculty and discuss the specific qualities that made their mentor a perfect candidate for the award and explain how their mentor affected their undergraduate education at Appalachian. Nominated Faculty members were then evaluated on their consistent track record of mentoring undergraduate students as well as supporting and encouraging students to present and publish their research or creative endeavors. Many of the Faculty nominated are often role models in their field.

We are pleased to announce the 2017 award winner was Dr. Andrew B. Heckert from the Department of Geological and Environmental Sciences.

His students stated the following:

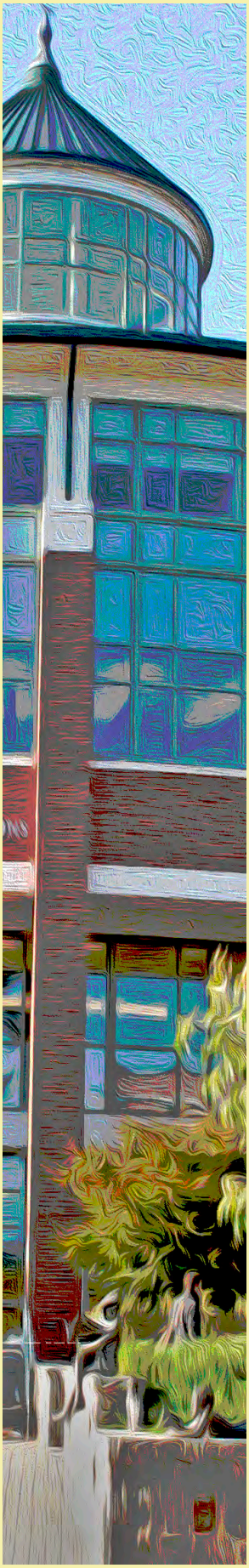
"Beyond his required professional duties Dr. Heckert regularly goes above and beyond to help his students succeed in the competitive field of paleontology. He helps guide each one of us personally, knowing our strengths and weaknesses, preparing use with skills we will need in our field, and connections to scientists across the world."

"He has communicated on my behalf with prominent scientists at the North Carolina Museum of Natural Sciences and established a pipeline for me to access their laboratory resources and collections, which gave me an opportunity to meet paleontologists that I plan to collaborate with in the future."

Congratulations again to Dr. Heckert!

The 2018 Undergraduate Research Mentorship Excellence Award will be announced during remarks given at 1:15 pm.

The Office of Student Research would like to thank all of the students who nominated their Faculty Mentors and all of the Faculty Mentors for making a significant impact on students.



Student Research Competition

on Latin American or Latino/Hispanic Subject

Appalachian@s, the new Hispanic and Latino Faculty and Staff organization at Appalachian State University, along with the Office of Student Research, announces the first Appalachian State University Latin American and Hispanic Research Day as part of Appalachian State University's Celebration of Student Research and Creative Endeavors.

Appalachian@s invites Appalachian State University students to submit a paper that relates to a Latin American or Latino/Hispanic subject.

Student presentations will take place from 9 AM to 11 AM on Thursday, April 19, 2018, in the Multicultural Center on the first floor of the Plemmons Student Union, as part of the 21st Annual Celebration of Student Research and Creative Endeavors.

A panel of faculty judges will evaluate the submissions and offer a $25 first prize, a $20 second prize and a $15 third prize to the top three entries.

The deadline for submissions is **Friday, March 30, 2018** by 5:00 pm. Send an electronic version of the paper, along with a one-page abstract that includes the title, subject, student's name, department, and sponsoring faculty member to Dr. Horst, horstrh@appstate.edu

Office of Student Research

APPALACHIAN STATE UNIVERSITY

RESEARCH DAY SCHEDULE 2018

MORNING (9:00 AM - 11:20 PM)

Room	Session	Time	#	Presenter(s)	
Beacon Heights 417	Oral	9:00 AM	1	Kate McCann	
	Oral	9:20 AM	2	Enzo Codella	
	Oral	9:40 AM	3	Alison Bird	
Rough Ridge 415	Oral	9:00 AM	4	Lucas Piedrahita	
	Oral	9:20 AM	5	Michael Paolino	
	Oral	9:40 AM	6	John Leppard	
Beacon Heights 417	Oral	10:20 AM	7	Annie Pharr	
	Oral	10:40 AM	8	Emily Cluen	
	Oral	11:00 AM	9	Laura Thompson	

	Mentor(s)	Title
	Dr. Michael Behrent *Department of History*	THE DEBATE OVER FRENCH INTERIOR SECURITY SINCE THE 2015 TERRORIST ATTACKS: SECURITY VS. CIVIL LIBERTIES
	Dr. Barbara Zaitzow *Department of Government and Justice Studies*	ALL BY MYSELF: MALADAPTIVE BEHAVIORS AND PSYCHOPATHOLOGIES ASSOCIATED WITH SOLITARY CONFINEMENT
	Ms. Marianne Adams *Department of Theatre and Dance*	THE PILATES METHOD AND ITS RELATIONSHIP TO PHYSICAL AND MENTAL AWARENESS: A PHENOMENOLOGICAL STUDY
	Dr. Jennifer Geib *Department of Biology*	FLOWERING SYNCHRONY, FLORAL DISPLAY, AND REPRODUCTIVE SUCCESS OF AN ALPINE CUSHION PLANT, SILENE ACAULIS
	Dr. Brooke Hester *Department of Physics and Astronomy*	ELUCIDATION OF DmoB CATALYST IDENTITY IN THE DEGRADATION OF DMS USING FLUORESCENCE EMISSION
	Dr. Paul Wallace *Department of Leadership and Educational Studies*	MEASURING PHYSIOLOGICAL AND AFFECTIVE RESPONSES TO VIDEO GAME MODALITIES
	Dr. Joy James *Department of Health and Exercise Science*	THE BENEFITS OF CAMP: NECESSITY OF THE OUTDOORS AND COMMUNITY IN THE DIGITAL AGE
	Dr. Joy James *Department of Health and Exercise Science*	OUT OF THE CABIN, OUT OF THE CLOSET: THE TRANSFORMATIVE EXPERIENCES OF CAMP AND IDENTITY EXPLORATION
	Dr. Maggie Sugg *Department of Geography and Planning*	ADOLESCENTS IN CRISIS: A GEOGRAPHIC EXPLORATION OF HELP-SEEKING FOR MENTAL DISTRESS FROM CRISIS TEXT LINE

MORNING (9:00 AM - 12:00 NOON)

Room	Session	Time	#	Presenter(s)
Undergraduate Poster Finalists *Parkway Ballroom 420*	Poster	9:00 AM–12:00 PM	P1U	Morgan Baker *
	Poster	9:00 AM–12:00 PM	P2U	Danielle Boase *
	Poster	9:00 AM–12:00 PM	P3U	Kevin Bynum *
	Poster	9:00 AM–12:00 PM	P4U	Jacob Dorsett *
	Poster	9:00 AM–12:00 PM	P5U	Charleston Gaillard *
	Poster	9:00 AM–12:00 PM	P6U	Allison Griggs *
	Poster	9:00 AM–12:00 PM	P7U	William Johnson *
	Poster	9:00 AM–12:00 PM	P8U	Carmen Montero *
	Poster	9:00 AM–12:00 PM	P9U	Maggie Smith *
	Poster	9:00 AM–12:00 PM	P10U	Emma Taylor *

*Denotes Poster Competition Finalists (Undergraduate and Graduate)

	Mentor(s)	Title
	Dr. Gabriele Casale *Department of Geological and Environmental Sciences*	DETERMINING THE ANNEALING CURVE OF RADIATION HALOS IN QUARTZ GRAINS THROUGH HEALING EXPERIMENTS
	Dr. Maggie Sugg *Department of Geography and Planning*	WEARABLE SENSORS FOR CONTINUOUS PREGNANCY HEALTH AND ENVIRONMENTAL MONITORING: FROM A PATIENT AND PROVIDER PERSPECTIVE
	Dr. Cynthia Liutkus-Pierce *Department of Geological and Environmental Sciences*	ANCIENT SOILS AND THEIR ROLE IN RECONSTRUCTING PALEOCLIMATE: STRATIGRAPHIC INTERPRETATION AND BULK GEOCHEMICAL ANALYSIS OF A MIOCENE FOSSIL SITE IN KENYA
	Dr. Scott Marshall *Department of Geological and Environmental Sciences*	WHERE IS THE SOUTHERN END OF THE SAN ANDREAS FAULT? A PHYSICS-BASED MODELING STUDY
	Dr. Kevin Zwetsloot *Department of Health and Exercise Science*	EXERCISE CHARACTERISTICS IN MANGANESE SUPEROXIDE DISMUTASE OVEREXPRESSING MICE
	Dr. Cara Fiore *Department of Biology*	FRESHWATER SPONGES ARE PREVALENT IN WESTERN NORTH CAROLINA AND HOST DIVERSE MICROBIAL SYSTEMS
	Dr. Kevin Zwetsloot *Department of Health and Exercise Science*	INFLUENCE OF 20-HYDROXYECDYSONE ON SKELETAL MUSCLE MONOCYTE INFILTRATION FOLLOWING ECCENTRIC DAMAGE
	Dr. Darren Seals *Department of Biology*	A SMALL-SCALE SCREEN OF NUTRACEUTICAL COMPOUNDS THAT AFFECT THE INVASIVE PROPERTIES OF CANCER CELLS
	Dr. Michael Opata *Department of Biology*	SPLENOCYTES FROM YOUNG MICE PROTECT IMMUNOCOMPRISED MICE AGAINST DEATH FROM MALARIA INFECTION, BUT THEY DO NOT PROLIFERATE WELL
	Dr. Abigail Stickford *Department of Health and Exercise Science*	HEALTH BEHAVIORS AND BELIEFS AMOUNG PREGNANT WOMEN IN RURAL COMMUNITIES

MORNING (9:00 AM - 12:00 NOON)

Room	Session	Time	#	Presenter(s)
Graduate Poster Finalists *Parkway Ballroom 420*	Poster	9:00 AM–12:00 PM	P1G	Lauren Anderson *
	Poster	9:00 AM–12:00 PM	P2G	Elizabeth Bailey *
	Poster	9:00 AM–12:00 PM	P3G	Kathryn Farina *
	Poster	9:00 AM–12:00 PM	P4G	Heather Guy *
	Poster	9:00 AM–12:00 PM	P5G	John Mackall *
	Poster	9:00 AM–12:00 PM	P6G	Jessica McCanless *
	Poster	9:00 AM–12:00 PM	P7G	Haley McGuirt *
	Poster	9:00 AM–12:00 PM	P8G	Wilton Norris *
	Poster	9:00 AM–12:00 PM	P9G	Elaine Wartinger *
	Poster	9:00 AM–12:00 PM	P10G	Adam Willits *

*Denotes Poster Competition Finalists (Undergraduate and Graduate)

	Mentor(s)	Title
	Dr. Maggie Sugg *Department of Geography and Planning*	AN ASSESSMENT OF WILDFIRE VULNERABILITY IN WESTERN NORTH CAROLINA, USA FOLLOWING THE 2016 WILDFIRES
	Dr. Maggie Sugg *Department of Geography and Planning*	CLIMATE AND CONFLICT INTERACTIONS: THE RELATIONSHIP BETWEEN CONFLICT SPIKES AND CLIMATE DEVIATIONS IN NORTHERN LATIN AMERICA
	Dr. Herman van Werkhoven *Department of Health and Exercise Science*	DOES FOOT STRIKE PATTERN CHANGE DURING A MAXIMAL 800-METER RUN?
	Dr. Baker Perry *Department of Geography and Planning*	SUBSEASONAL VARIATIONS OF STABLE WATER ISOTOPES IN TROPICAL ANDEAN PRECIPITATION
	Dr. Alan Needle *Department of Health and Exercise Science*	THE EFFECTS OF ECCENTRIC MUSCLE DAMAGE ON NEURAL INHIBITION
	Dr. Maryam Ahmed *Department of Biology*	MODULATION OF THE BREAST CANCER TUMOR MICROENVIRONMENT BY ONCOLYTIC VESICULAR STOMATITIS VIRUS
	Dr. Andrew Bellemer *Department of Biology*	THE ROLE OF TRANSLATIONAL REGULATION BY TOR AND LK6 IN PAIN SENSITIVITY
	Dr. Herman van Werkhoven *Department of Health and Exercise Science*	pQCT AS AN ALTERNATIVE TO MRI TO QUANTIFY 3D BONE GEOMETRY - A FEASIBILITY STUDY
	Dr. Laura McArthur *Department of Nutrition and Healthcare Management*	PREVALENCE AND CORRELATES OF FAMILY AND CAMPUS FOOD INSECURITY AMONG FRESHMAN AT A UNIVERSITY IN APPALACHIA
	Dr. Andrew Bellemer *Department of Biology*	THE ROLES OF CELLULAR SIGNALING PATHWAYS IN REGULATING NOCICEPTIVE BEHAVIOR IN DROSOPHILA

MORNING (9:00 AM - 12:00 NOON)

Room	Session	Time	#	Presenter(s)
Parkway Ballroom 420	Poster	9:00 AM–12:00 PM	P1.1	Angelina Azieva
	Poster	9:00 AM–12:00 PM	P1.2	Jessica Barnwell
	Poster	9:00 AM–12:00 PM	P1.3	Erin Bishop
	Poster	9:00 AM–12:00 PM	P1.4	Whitney Bond
	Poster	9:00 AM–12:00 PM	P1.5	Cameron Brown
	Poster	9:00 AM–12:00 PM	P1.6	Anna Ruth Carmichael
	Poster	9:00 AM–12:00 PM	P1.7	William Cheek
	Poster	9:00 AM–12:00 PM	P1.8	Logan Clark
	Poster	9:00 AM–12:00 PM	P1.9	Hunter Cox
	Poster	9:00 AM–12:00 PM	P1.10	Emily Curlin
	Poster	9:00 AM–12:00 PM	P1.11	Austin Deans
	Poster	9:00 AM–12:00 PM	P1.12	Yanelis Delgado
	Poster	9:00 AM–12:00 PM	P1.13	Jena Donovan
	Poster	9:00 AM–12:00 PM	P1.14	Emily Fedders
	Poster	9:00 AM–12:00 PM	P1.15	Kitt Franse
	Poster	9:00 AM–12:00 PM	P1.16	Gita Gajjar

	Mentor(s)	Title
	Dr. Nicholas Shaw *Department of Chemistry*	SYNTHESIS OF BIODIESEL FUEL FROM WASTE COOKING OIL USING NANO-REACTORS
	Dr. Margaret Barth *Department of Nutrition and Healthcare Management*	IMPLEMENTATION OF THE mNUTRIC SCORE IN RURAL CRITICAL CARE UNITS: A CONTINUOUS QUALITY IMPROVEMENT STUDY
	Dr. Tatyana Ruseva *Department of Government and Justice Studies*	AN ANALYSIS OF SOUTHERN APPALACHIAN FAMILY FOREST OWNER VALUES AND DERIVED BENEFITS IN RELATION TO CARBON OFFSET MECHANISMS
	Dr. Ece Karatan *Department of Biology*	CHARACTERIZING THE DOMAINS OF THE BIOFILM REGULATING PROTEIN MbaA IN VIBRIO CHOLERAE
	Dr. Shawn Bergman *Department of Psychology*	THE DARK SIDE TO PERFORMANCE APPRAISAL
	Dr. Rebecca Kappus *Department of Health and Exercise Science*	SEX DIFFERENCES IN OXIDATIVE STRESS: IMPLICATIONS ON VASCULAR FUNCTION
	Dr. William Anderson *Department of Geological and Environmental Sciences*	SOUTH FORK NEW RIVER STREAM DISCHARGE ANALYSIS
	Dr. Matt Estep *Department of Biology*	DEVELOPMENT OF MICROSATELLITE MARKERS TO EVALUATE CURRENT SPECIES BOUNDARIES BETWEEN LIATRIS HELLERI PORTER AND LIATRIS TURGIDA GAISER
	Dr. Matt Estep *Department of Biology*	ANALYSIS OF CAMERA PLACEMENT FOR VERTEBRATE SURVEYS AND OTHER ECOLOGICAL STUDIES
	Dr. Martin Root *Department of Nutrition and Healthcare Management*	EXTREME BIRTHWEIGHTS AND METABOLIC SYNDROME IN ADULTHOOD
	Dr. Andrew Heckert *Department of Geological and Environmental Sciences*	NEW LATE CRETACEOUS (EARLY CAMPANIAN) MICROFOSSIL ASSEMBLAGE FROM THE UPPER CRETACEOUS OF NEW MEXICO
	Dr. Andrew Heckert *Department of Geological and Environmental Sciences*	DETAILED 3D MODELS OF A JUVENILE FOSSILE REPTILE FROM THE UPPER TRIASSIC OF NORTH CAROLINA CREATED USING AGISOFT AND A KEYENCE 3D MICROSCOPE
	Dr. Alan Needle *Department of Health and Exercise Science*	VESTIBULAR REHABILITATION IN CONCUSSION RTP PROTOCOLS
	Dr. William Anderson *Department of Geological and Environmental Sciences*	MODELING AIR TEMPERATURE/WATER TEMPERATURE RELATIONS ALONG A SMALL MOUNTAIN STREAM UNDER INCREASING URBAN INFLUENCE
	Dr. Mary Kinkel *Department of Biology*	INTESTINAL ADAPTION: THE ADULT ZEBRAFISH AS A MODEL FOR HUMAN INTESTINAL EXPLORATION
	Dr. Andrew Bellemer *Department of Biology*	THE ROLE OF THE eIF4F COMPLEX IN NOCICEPTOR SENSITIVITY

MORNING (9:00 AM - 12:00 NOON)

Room	Session	Time	#	Presenter(s)
Parkway Ballroom 420	Poster	9:00 AM–12:00 PM	P1.17	Katie Hahn
	Poster	9:00 AM–12:00 PM	P1.18	Nicholas Hammond
	Poster	9:00 AM–12:00 PM	P1.19	Margaret Hancock
	Poster	9:00 AM–12:00 PM	P1.20	Katherine Hoffman
	Poster	9:00 AM–12:00 PM	P1.21	Cameron Hubbard
	Poster	9:00 AM–12:00 PM	P1.22	Kathleen Jablonski
	Poster	9:00 AM–12:00 PM	P1.23	Kelsey Johnson
	Poster	9:00 AM–12:00 PM	P1.24	Joseph Jonaitis
	Poster	9:00 AM–12:00 PM	P1.25	April Kaiser
	Poster	9:00 AM–12:00 PM	P1.26	Zachary Kopkin
	Poster	9:00 AM–12:00 PM	P1.27	Emma Labovitz
	Poster	9:00 AM–12:00 PM	P1.28	Hayden Lane
	Poster	9:00 AM–12:00 PM	P1.29	Kelly Loucks
	Poster	9:00 AM–12:00 PM	P1.30	Samantha Malone
	Poster	9:00 AM–12:00 PM	P1.31	Cassidy Miles

	Mentor(s)	Title
	Dr. Cortney Bouldin *Department of Biology*	CHARACTERIZING A TRANSGENIC LINE THAT DELAYS THE FIRST GAP PHASE OF THE CELL CYCLE
	Dr. Sarah Evans *Department of Geological and Environmental Sciences*	EFFECT OF SOIL ORGANIC CARBON CONTENT ON RIPARIAN NITRATE ATTENUATION DURING STREAM STAGE FLUCTUATIONS
	Dr. Robyn Kondrad *Department of Psychology*	THE LIMITS OF SOCIAL CATERGORIES ON PRESCHOOLERS' SELECTIVE TRUST
	Dr. Andrew Bellemer *Department of Biology*	PROTEIN SYNTHESIS REGULATORS CONTROL SENSORY NEURON SENSITIVITY IN DROSOPHILA MELANOGASTER LARVAE
	Dr. Melissa Gutschall *Department of Nutrition and Healthcare Management*	FOOD SECURITY STATUS IN RURAL NORTH CAROLINA: EXPLORING COPING STRATEGIES AMONG COMMUNITY RESIDENTS
	Dr. Marting Root *Department of Nutrition and Healthcare Management*	EVALUATING ADHERENCE TO A VOLUME-BASED FEEDING PROTOCOL IN FOUR ADULT INTENSIVE CARE UNITS
	Dr. Melissa Gutschall *Department of Nutrition and Healthcare Management*	DEFINING THE TRADITIONAL APPALACHIAN DIET: AN ANALYSIS OF KEY REGIONAL COOKBOOKS
	Dr. Baker Perry *Department of Geography and Planning*	SPATIOTEMPORAL VARIABILITY OF PRECIPITATION IN THE TROPICAL ANDES OF SOUTHERN PERU AND BOLIVIA DURING THE 2015-16 STRONG EL NIÑO
	Dr. Saskia van de Gevel *Department of Geography and Planning*	COMPARING WHITEBARK PINE RADIAL GROWTH RESPONSE TO CLIMATE VARIABLES IN THE CASCADES AND SIERRA NEVADA, USA
	Dr. Robert Perdue *Department of Sociology*	SCRAPBOOK OF APPALACHIAN STORYTELLING AND THE LANDSCAPE
	Dr. Renee Scherlen *Department of Government and Justice Studies*	RHETORIC VS. REALITY: REFUGEES IN SWEDEN AND ITS POLITICAL CONSEQUENCES IN THE U.S.
	Dr. Jefferson Bates *Department of Chemistry*	SURFACES ARE EVERYWHERE: A COMPUTATIONAL INVESTIGATION INTO SILICA ADSORPTION INTERFACES
	Dr. Nicholas Shaw *Department of Chemistry*	DIRECT AMIDE BOND COUPLING OF AMINO ACIDS IN NANO-REACTORS
	Dr. Denise Martz *Department of Psychology*	FAT TALK AND ROMANTIC RELATIONSHIPS: DOES FAT TALK AFFECT RELATIONSHIP SATISFACTION AND SEXUAL SATISFACTION?
	Dr. Brooke Hester *Department of Physics and Astronomy*	AN AUTOMATED OPTICAL TWEEZERS INSTRUMENT FOR CALIBRATION, DATA COLLECTION, AND EXPERIMENTAL DETERMINATION OF TEMPERATURE

MORNING (9:00 AM - 12:00 NOON)

Room	Session	Time	#	Presenter(s)
Parkway Ballroom 420	Poster	9:00 AM–12:00 PM	P1.32	Jeffrey Miller
	Poster	9:00 AM–12:00 PM	P1.33	Jordan Miller
	Poster	9:00 AM–12:00 PM	P1.34	Kayla Mitchell
	Poster	9:00 AM–12:00 PM	P1.35	Evan Montpellier
	Poster	9:00 AM–12:00 PM	P1.36	Forrest Myers
	Poster	9:00 AM–12:00 PM	P1.37	Victoria Nothnagel
	Poster	9:00 AM–12:00 PM	P1.38	Zachary Osborne
	Poster	9:00 AM–12:00 PM	P1.39	Olivia Paschall
	Poster	9:00 AM–12:00 PM	P1.40	Julieanne Pike
	Poster	9:00 AM–12:00 PM	P1.41	Nathan Potvin
	Poster	9:00 AM–12:00 PM	P1.42	Tyler Pyle
	Poster	9:00 AM–12:00 PM	P1.43	Courtney Roberts
	Poster	9:00 AM–12:00 PM	P1.44	Danna Rodriguez
	Poster	9:00 AM–12:00 PM	P1.45	Caroline Sharrits

	Mentor(s)	Title
	Dr. Laura McArthur *Department of Nutrition and Healthcare Management*	PREVALENCE AND CORRELATES OF FAMILY AND CAMPUS FOOD INSECURITY AMONG FRESHMAN ATTENDING A UNIVERSITY IN APPALACHIA
	Dr. Ellen Cowan *Department of Geological and Environmental Sciences*	COMPARISON OF LATE PLEISTOCENE ICE RAFTING RECORDS WITHIN THE NE PACIFIC
	Dr. Peter Soule' *Department of Geography and Planning*	RECONSTRUCTING SUMMER UPPER-LEVEL FLOW IN THE NORTHERN ROCKY MOUNTAINS USING AN ALPINE LARCH (LARIX LYALLII) TREE-RING CHRONOLOGY
	Dr. Brooke Hester *Department of Physics and Astronomy*	OPTICAL TRAPPING AND OPTIMIZED POSITION DETECTION OF METALLIC NANOPARTICLES
	Dr. Alan Needle *Department of Health and Exercise Science*	IN COLLEGIATE ATHLETES POST ACL SURGERY, HOW DOES ELECTRICAL STIMULATION WITH REHABILITATION COMPARED TO REHABILITATION ALONE AFFECT STRENGTH?
	Dr. Saskia van de Gevel *Department of Geography and Planning*	GEOGRAPHIC INQUIRY IN NORTH CAROLINA: AN ASSESSMENT OF TECHNOLOGY IN K-12 GEOGRAPHY EDUCATION
	Dr. Sarah Carmichael *Department of Geological and Environmental Sciences*	87Sr/86Sr ACROSS THE DEVONIAN-CARBONIFEROUS TRANSITION WITHIN THE PHO HAN FORMATION, CAT BA ISLAND, VIETNAM: NEW DATA OUTSIDE OF AN OLD CATEGORY
	Dr. Lisa McAnulty *Department of Nutrition and Healthcare Management*	TIME COURSE OF BLUEBERRY INGESTION ON MEASURES OF ARTERIAL STIFFNESS AND BLOOD PRESSURE
	Dr. Mohammad Mohebbi *Department of Computer Science*	MINING CORRELATIONS OF TOPOGRAPHIC MAP FEATURES WITH RATINGS OF LOCAL BUSINESSES
	Dr. Cortney Boulding *Department of Biology*	CELL CYCLE MANIPULATION: QUANTIFYING EFFECTS OF AN EXTENDED G1 PHASE ON CIRCULATION IN DEVELOPING DANIO RERIO
	Dr. Lynn Siefferman *Department of Biology*	THE DYNAMICS OF POPULATION DENSITY, PERSONALITY, AND DISEASE PREVALENCE
	Dr. Darci Gardner *Department of Languages, Literatures and Cultures*	DÉGÉNÉRESCENCE IN FIN-DE-SIÈCLE FRANCE: A CASE STUDY
	Dr. Abigail Stickford *Department of Health and Exercise Science*	EFFECTS OF PHYSICAL ACTIVITY ON SYMPATHETIC, CARDIOVASCULAR, AND PERCEPTUAL RESPONSES TO A PAINFUL STIMULUS
	Dr. Lisa McAnulty *Department of Nutrition and Healthcare Management*	SLIDING SCALE INSULIN VS. SLIDING SCALE AND BASAL-BOLUS INSULIN REGIMENS IN HOSPITALIZED DIABETIC PATIENTS: A QUALITY IMPROVEMENT PROJECT

MORNING (9:00 AM - 12:00 NOON)

Room	Session	Time	#	Presenter(s)
Parkway Ballroom 420	Poster	9:00 AM–12:00 PM	P1.46	Marietta Shattelroe
	Poster	9:00 AM–12:00 PM	P1.47	Dalton Sizemore
	Poster	9:00 AM–12:00 PM	P1.48	Corrine Spiczenski
	Poster	9:00 AM–12:00 PM	P1.49	Megan Tennant
	Poster	9:00 AM–12:00 PM	P1.50	Christopher Thompson
	Poster	9:00 AM–12:00 PM	P1.51	Douglas Watson
	Poster	9:00 AM–12:00 PM	P1.52	Elizabeth Watson
	Poster	9:00 AM–12:00 PM	P1.53	Desa Wells
	Poster	9:00 AM–12:00 PM	P1.54	Lyndsay Wilcox
	Poster	9:00 AM–12:00 PM	P1.55	Matthew Wilson
	Poster	9:00 AM–12:00 PM	P1.56	Amber Woodington
	Poster	9:00 AM–12:00 PM	P1.57	Virginia Woollens
	Poster	9:00 AM–12:00 PM	P1.58	Erin Young

	Mentor(s)	Title
	Dr. Matt Estep *Department of Biology*	ASSEMBLING A MOLECULAR TOOLKIT FOR GEUM GENICULATUM MICHX
	Dr. Darren Seals *Department of Biology*	EFFECT OF POLARIZATION STATUS ON THE DEGRADATIVE ABILITY OF THP-1 DERIVED MACROPHAGES
	Dr. Melissa Gutschall *Department of Nutrition and Healthcare Management*	DIFFERENCES IN LEARNING OUTCOMES BETWEEN UNDERGRADUATE DIETETICS STUDENTS PARTICIPATING IN CAMPUS-BASED VS. COMMUNITY-BASED FOOD PRODUCTION EXPERIENCE
	Dr. Ted Zerucha *Department of Biology*	CHARACTERIZATION OF THE Meis2 LOCUS
	Dr. Kyle Thompson *Department of Nutrition and Healthcare Management*	IMPROVING MEAL DELIVERY TIMES IN A ROOM SERVICE FOODSERVICE MODEL IN A SUBURBAN HOSPITAL: A LEAN SIX SIGMA APPROACH
	Dr. Annakatrin Rose *Department of Biology*	DISCOVERING MFP1'S ROLE IN PATHOGENIC STRESS RESPONSES
	Dr. Alan Needle *Department of Health and Exercise Science*	THE EFFECTS OF MULTIPLE MODALITIES OF COGNITIVE LOAD ON DYNAMIC BALANCE IN PATIENTS WITH CHRONIC ANKLE INSTABILITY
	Dr. Margaret Barth *Department of Nutrition and Healthcare Management*	DEVELOPMENT OF HEALTHFUL LIVING CORE CURRICULUM FOR THE LETTUCE LEARN PROGRAM FOR SCHOOL-AGED CHILDREN IN WATAUGA COUNTY, NORTH CAROLINA
	Dr. Peter Fawson *Department of Social Work*	EXPLORING COPING SKILLS OF HOSPITALIZED CHILDREN: A CHILDREN'S BOOK PROPOSAL
	Dr. Maggie Sugg *Department of Geography and Planning*	A SOCIO-ECOLOGICAL AND SPATIAL ANALYSIS OF NURSING HOME VULNERABILITY IN THE SOUTHEASTERN UNITES STATES
	Dr. Nicholas Shaw *Department of Chemistry*	DEVELOPMENT OF METHODOLOGY FOR THE SAPONIFICATION OF ESTERS IN NANO-REACTORS
	Dr. Margaret Barth *Department of Nutrition and Healthcare Management*	HUNGER AND ENVIRONMENTAL NUTRITION (HEN) GARDEN LAB: TEACHING PRACTICES AND PARTICIPANT OUTCOMES IN A GARDEN LITERACY PROGRAM TARGETING NUTRITION AND DIETETICS STUDENTS
	Dr. Ece Karatan *Department of Biology*	IDENTIFICATION OF THE BINDING INTERFACE BETWEEN NspS AND MbaA IN VIBRIO CHOLERAE

AFTERNOON (1:00 PM - 3:20 PM)

Room	Session	Time	#	Presenter(s)	
Parkway Ballroom 420		**1:15 PM**	**Poster Competition Aportfolio Scholar Award Presentations**		
Beacon Heights 417	Oral	1:00 PM	10	Shaina Katz	
	Oral	1:20 PM	11	Seth Fraser	
	Oral	1:40 PM	12	Jacob Meadows	
Rough Ridge 415	Oral	1:00 PM	13	Jamison Slate	
	Oral	1:20 PM	14	Byron Burrell	
	Oral	1:40 PM	15	Veda Stocton	
Beacon Heights 417	Oral	2:20 PM	16	Jaelyn Felder	
	Oral	2:40 PM	17	Mariah Reneau	
	Oral	3:00 PM	18	Lily Shaw	
Rough Ridge 415	Oral	2:20 PM	19	Morgen Dugan	
	Oral	2:40 PM	20	Ethan Finlay	
	Oral	3:00 PM	21	Mary Clare Gabel	

	Mentor(s)	Title
	Remarks	
	Dr. Cary Fraser *Department of Government and Justice Studies*	JORDAN WITHIN THE SHIFTING BALANCE OF MIDDLE EAST POLITICS
	Dr. Tammatha Clodfelter *Department of Government and Justice Studies*	MODERN TRENDS IN RIOTS AND PROTESTS
	Dr. Lee Ball *Office of Sustainability*	SUSTAINABILITY AT APPALACHIAN STATE UNIVERSITY: A HISTORY SINCE 1899
	Dr. Maryam Ahmed *Department of Biology*	THERAPEUTIC EFFECTS OF SUBFRACTIONS ISOLATED FROM ETHANOLIC MORINGA OLEIFERA LEAF EXTRACTS IN CANCER AND INFLAMMATORY DISEASES
	Dr. Matt Estep *Department of Biology*	HABITAT PREFERENCES AND HERBIVORY EFFECTS IN A RARE PLANT PRESERVE WITH REDUCED HUMAN INTERACTION
	Dr. Mira Waits *Department of Art*	INDELICATE PHILOSOPHIES: THE CONVERGENCE OF FRENCH AND JAPANESE EROTIC ARTS
	Dr. Newly Paul *Department of Communication*	THE EXPLORATION OF THE BLACK WOMEN'S TRUTH: LINKING SLAVERY, STEREOTYPES, AND MEDIA
	Dr. Chris Patti *Department of Communicaiton*	LOOKING AT THE REALITY OF PARTY CULTURE: AN ETHNOGRAPHIC LOOK AT THE GOOD, THE BAD AND THE UGLY
	Dr. Joseph Gonzalez *Department of Cultural, Gender and Global Studies*	SWINGING THROUGH SOCIAL CHANGE: DOES LINDY HOP PROMOTE GENDER EQUALITY?
	Dr. Nicholas Shaw *Department of Chemistry*	AN EXPLORATION OF C-TERMINUS PEPTIDE GROWTH IN NANO-REACTORS
	Dr. Nicholas Shaw *Department of Chemistry*	EFFICIENT AND COMPLETE SYNTHESIS OF BIODIESEL FUEL USING NANO-REACTORS
	Dr. Christopher Seitz *Department of Health and Exercise Science*	READABILITY OF ONLINE EDUCATIONAL PRE-ECLAMPSIA MATERIAL

AFTERNOON (1:00 PM - 4:00 PM)

Room	Session	Time	#	Presenter(s)
Parkway Ballroom 420	Poster	1:00–4:00 PM	P2.1	Peyton Attaway
	Poster	1:00–4:00 PM	P2.2	Yasmin Ayala-Johnson
	Poster	1:00–4:00 PM	P2.3	Jessica Barker
	Poster	1:00 - 4:00 PM	P2.4	Tristan BeDell
	Poster	1:00–4:00 PM	P2.5	Margaret Bennett
	Poster	1:00–4:00 PM	P2.6	Garrett Bonds
	Poster	1:00–4:00 PM	P2.7	Sarah Booze
	Poster	1:00–4:00 PM	P2.8	Nickolas Brand
	Poster	1:00–4:00 PM	P2.9	Daniel Brehm
	Poster	1:00–4:00 PM	P2.10	Claire Brown
	Poster	1:00–4:00 PM	P2.11	Megan Campany
	Poster	1:00–4:00 PM	P2.12	Cassidy Chapman
	Poster	1:00–4:00 PM	P2.13	Ashley Childers
	Poster	1:00–4:00 PM	P2.14	Abigale Clapham
	Poster	1:00–4:00 PM	P2.15	Kristin Collins
	Poster	1:00–4:00 PM	P2.16	Katelyn Currie

	Mentor(s)	Title
	Dr. Erin Bouldin *Department of Health Sciences*	EFFECTS OF ADVERSE CHILDHOOD EXPERIENCES ON ALCOHOL ABUSE IN ADULTHOOD
	Dr. Yalcin Acikgoz *Department of Psychology*	CROSS CULTURAL EXAMINATION OF APPLICANT REACTIONS TO SOCIAL MEDIA SCREENING
	Dr. Newly Paul *Department of Communication*	PLAYING THE RACE AND GENDER CARD ON SOCIAL MEDIA. HOW MINORITIY CONGRESSWOMEN USE TWITTER TO COMMUNICATE WITH THE PUBLIC
	Dr. Jamie Levine *Department of Geological and Environmental Sciences*	FIELD AND THERMOCHRONOMETRIC CONSTRAINTS ON MOTION ALONG THE FRIES AND GOSSAN LEAD FAULTS, NEAR BOONE, NC
	Dr. Adam Hege *Department of Health and Exercise Science*	ADVERSE CHILDHOOD EXPERIENCES AND FOOD INSECURITY IN APPALACHIA
	Dr. Ece Karatan *Department of Biology*	THE EFFECTS OF BIOFILM FORMATION ON VIBRIO CHOLERAE COLONIZATION IN ZEBRAFISH
	Dr. Jeanne Dubino *Department of Cultural, Gender and Global Studies*	THE TRUE POWER OF MYTHS: AN ANALYSIS OF THE EFFECTS OF MYTHOLOGY ON JAPANESE NATIONALISM
	Dr. Andrew Heckert *Department of Geological and Environmental Sciences*	THE ELASMOBRANCH (CHONDRICHTHYES: SHARKS AND RAYS) PALEOFAUNAL ASSEMBLAGE OF THE UPPER CRETACEOUS WILLIAMS FORK FORMATION (NORTHWESTERN COLORADO): RECONSTRUCTING A 72 MILLION YEAR OLD BRACKISH WATER ECOSYSTEM
	Dr. Clark Maddux *Watauga Residential College*	SUSTAINABLE WASTE MANAGEMENT POST-NATURAL DISASTERS
	Dr. Brooke Hester *Department of Physics and Astronomy*	DUAL OPTICAL TWEEZERS CONFIGURATION FOR MEASUREMENT OF FORCES AND ELASTICITY IN BIOLOGICAL SYSTEMS
	Dr. Scott Collier *Department of Health and Exercise Science*	INVESTIGATION OF SEX DIFFERENCES BETWEEN NOKIA BODY CARDIO AND SPHYGMOCOR APPLANATION TECHNOLOGY
	Dr. Nicholas Shaw *Department of Chemistry*	AN EXPLORATION OF N-TERMINUS PEPTIDE GROWTH IN NANO-REACTORS
	Dr. Martin Root *Department of Nutrition and Healthcare Management*	A PROSPECTIVE STUDY OF MEDITERRANEAN DIET: ADHERENCE AND COGNITIVE DECLINE
	Dr. Martin Root *Department of Nutrition and Healthcare Management*	DOES BODY MASS INDEX MEDIATE THE ASSOCIATION BETWEEN MEAT INTAKE AND INSULIN SENSITIVITY?
	Dr. Yalcin Acikgoz *Department of Psychology*	DEVELOPING A CONDITIONAL REASONING TEST FOR IMPRESSION MANAGEMENT
	Dr. Amy Galloway *Department of Psychology*	BABY LED WEANING IN THE UNITED STATES: A DESCRIPTIVE STUDY OF INFANT FEEDING PRACTICES

AFTERNOON (1:00 PM - 4:00 PM)

Room	Session	Time	#	Presenter(s)
Parkway Ballroom 420	Poster	1:00–4:00 PM	P2.17	Amber Daniel
	Poster	1:00–4:00 PM	P2.18	Tierney Daw
	Poster	1:00–4:00 PM	P2.19	Matthew Eads
	Poster	1:00–4:00 PM	P2.20	Logan Ellis
	Poster	1:00–4:00 PM	P2.21	Audrey Everett
	Poster	1:00–4:00 PM	P2.22	Ciera Ferrone
	Poster	1:00–4:00 PM	P2.23	Mary Butler Fleming
	Poster	1:00–4:00 PM	P2.24	Jarod Fyler
	Poster	1:00–4:00 PM	P2.25	Katharine Garrity
	Poster	1:00–4:00 PM	P2.26	Karen Gibson
	Poster	1:00–4:00 PM	P2.27	Joshua Godwin
	Poster	1:00–4:00 PM	P2.28	Glen Gonzalez
	Poster	1:00–4:00 PM	P2.29	Mellanee Goodman
	Poster	1:00–4:00 PM	P2.30	Taylor Goodman
	Poster	1:00–4:00 PM	P2.31	Elizabeth Goughnour
	Poster	1:00–4:00 PM	P2.32	Daniel Govert
	Poster	1:00–4:00 PM	P2.33	Lydia Harris

	Mentor(s)	Title
	Dr. Alex Howard *Department of Health and Exercise Science*	STUDENT ATHLETES AND MENTAL HEALTH: AN EXPLORATION OF POTENTIAL HURDLES TO STUDENT SUCCESS
	Dr. Mary Kinkel *Department of Biology*	OPTIMIZING USE OF ARTEMIA AS A FOOD SOURCE FOR LARVAL ZEBRAFISH
	Dr. Andrew Heckert *Department of Geological and Environmental Sciences*	TAKING A BITE OUT OF PLATINUM AND TIN-BASED SILICONE RUBBER LIFE CLAIMS
	Dr. Yalcin Acikgoz *Department of Psychology*	APPLICANT REACTIONS TO ARTIFICIAL INTELLIGENCE IN THE SELECTION PROCESS
	Dr. Valerie Wieskamp *Department of Communication*	COLOR GRADING IN FILM: HOW COMPLEMENTARY COLORS AFFECT AN AUDIENCE'S PERCEPTION OF MOOD
	Dr. Twila Wingrove *Department of Psychology*	QUALITATIVE ANALYSES OF CURRENT CAMPUS SEXUAL ASSAULT STEREOTYPES
	Dr. Matt Estep *Department of Biology*	GIS MAPPING AND HABITAT DELINEATION OF THE TATER HILL FEN (BOG)
	Dr. Yalcin Acikgoz *Department of Psychology*	ADDING VS. AVERAGING: HOW DO JOB APPLICANTS EVALUATE JOB ATTRIBUTES?
	Dr. Melissa Gutschall *Department of Nutrition and Healthcare Management*	REPORTED SELF EFFICACY AMONG PARTICIPANTS OF NUTRITION SERVICES AT A LOCAL FOOD BANK AND RESOURCE CENTER IN RURAL NORTH CAROLINA
	Dr. Mohammad Mohebbi *Department of Computer Science*	VALIDATION OF microRNA TARGET INTERACTIONS FOR ACCURATE PREDICTIONS
	Dr. Andrew Shanely *Department of Health and Exercise Science*	RECOVERY FROM IN VIVO ECCENTRIC SKELETAL MUSCLE DAMAGE: OLD VERSUS YOUNG
	Dr. Andrew Heckert *Department of Geological and Environmental Sciences*	OLD VS. NEW: A COMPARISON OF FOSSIL REPLICATION TECHNIQUES
	Dr. Jody Servon *Department of Art*	RADICAL FEMINISTS
	Dr. Abigail Stickford *Department of Health and Exercise Science*	THE EFFECTS OF ANXIETY ON PSYCHOBIOLOGICAL INDICATORS OF PHYSIOLOGICAL STRESS
	Dr. Baker Perry, *Department of Geography and Planning*	VIOLENT CRIME: AN ANALYSIS OF NEW YORK AND CHICAGO
	Dr. Cole Edwards *Department of Geological and Environmental Sciences*	STRONTIUM ISOTOPE (87SR/86SR) STRATIGRAPHY OF LOWER DEVONIAN CARBONATE ROCKS FROM THE GREAT BASIN REGION: TESTING SR ISOTOPE METHODS USING CONODONT APATITE AND BULK CARBONATE
	Dr. Megen Culpepper *Department of Chemistry*	CO-EXPRESSION USING THE DUAL PLASMID APPROACH OF THE TWO SUBUNIT PROTEIN DIMETHYLSULFIDE MONOOXYGENASE FROM HYPHOMICROBIUM SULFONIVORANS

AFTERNOON (1:00 PM - 4:00 PM)

Room	Session	Time	#	Presenter(s)
Parkway Ballroom 420	Poster	1:00–4:00 PM	P2.34	Jessie Hatcher
	Poster	1:00–4:00 PM	P2.35	Amanda Hendrix
	Poster	1:00–4:00 PM	P2.36	Charlie Hodgman
	Poster	1:00–4:00 PM	P2.37	Tania Katherine Ita Vargas
	Poster	1:00–4:00 PM	P2.38	Rachel Jordan
	Poster	1:00–4:00 PM	P2.39	Michaela Kirby
	Poster	1:00–4:00 PM	P2.40	Rebekah Knight
	Poster	1:00–4:00 PM	P2.41	Katie Krogmeier
	Poster	1:00–4:00 PM	P2.42	Vanna Labi
	Poster	1:00–4:00 PM	P2.43	William Lamb
	Poster	1:00–4:00 PM	P2.44	Erica Larson
	Poster	1:00–4:00 PM	P2.45	Katie Lorenzini
	Poster	1:00–4:00 PM	P2.46	Austin Lubkemann
	Poster	1:00–4:00 PM	P2.47	Carly Maas
	Poster	1:00–4:00 PM	P2.48	Melanie Mcmillan

	Mentor(s)	Title
	Dr. Matt Estep *Department of Biology*	DEVELOPMENT OF MICROSATELLITE MARKERS FOR DIVERSITY STUDIES WITHIN THE GENUS DICENTRA
	Dr. Andrew Heckert *Department of Geological and Environmental Sciences*	REVISITING THE ALLISON MEMBER OF THE MENEFEE FORMATION (UPPER CRETACEOUS: EARLY CAMPANIAN) SAN JUAN BASIN, NEW MEXICO
	Dr. Kevin Zwetsloot *Department of Health and Exercise Science*	PHYTOECDYSTEROIDS ENHANCE SKELETAL MUSCLE FUNCTION RECOVERY FOLLOWING IN VIVO ECCENTRIC CONTRACTION INDUCED INJURY IN OLD MICE
	Dr. Baker Perry *Department of Geography and Planning*	SYNOPTIC PATTERNS ASSOCIATED WITH EARLY AND LATE ONSET OF THE WET SEASON IN SOUTHERN PERUVIAN ANDES
	Dr. Howard Neufeld *Department of Biology*	COMPARATIVE ECOPHYSIOLOGY OF TWO HIGH ELEVATION CONIFERS IN THE SOUTHERN APPALACHIANS: THE IMPORTANCE OF THE WINTER SEASON
	Dr. Rose Mary Webb *Department of Psychology*	DO OUR CELL PHONE PHOTOGRAPHS REVEAL OUR PERSONALITIES?
	Dr. Lisa Emery *Department of Psychology*	AWARENESS, ATTENTION, ACCEPTANCE: HOW MINDFULNESS AS AN EMOTION REGULATION STRATEGY COULD REDUCE ANXIETY
	Dr. Matt Estep *Department of Biology*	DIGITIZING THE TATER HILL PLANT PRESERVE COLLECTIONS
	Dr. Richard Christiana *Department of Health and Exercise Science*	TIME SPENT OUTDOORS, PHYSICAL ACTIVITY AND MENTAL HEALTH STATUS AMONG COLLEGE STUDENTS: BASELINE DATA FROM THE STUDENT PARK AMBASSADOR PILOT STUDY
	Dr. Cole Edwards *Department of Geological and Environmental Sciences*	TESTING WHETHER LATE ORDOVICIAN CARBON ISOTOPE EXCURSIONS RECORD RAPID VARIATIONS IN THE GLOBAL CARON CYCLE
	Dr. Andrew Shanely *Department of Health and Exercise Science*	EXERCISE PERFORMANCE AND PERCEPTION OF BREATHLESSNESS AFTER CAFFEINE INGESTION IN TRAINED CYCLISTS
	Mr. Jason Hoyle *Department of Sustainable Technology and the Built Environment*	ALTERNATIVE BILLING METHODS FOR WATAUGA COUNTY MUNICIPAL BUILDINGS
	Dr. Scott Collier *Department of Health and Exercise Science*	VALIDITY OF NOKIA PULSE WAVE VELOCITY SCALE VERSUS GOLD STANDARD APPLANATION TONOMETRY IN A YOUNG HEALTHY POPULATION
	Dr. William Anderson *Department of Geological and Environmental Sciences*	MICRO-WETLAND IN URBAN TOPOGRAPHY TO MITIGATE SALT CONTAMINATION
	Dr. Ian Snider *Department of Biology*	ASSESSING THE VALUE OF AVIAN ECOLOGY FOR SUSTAINABLE WOODLAND MANAGEMENT

AFTERNOON (1:00 PM - 4:00 PM)

Room	Session	Time	#	Presenter(s)
Parkway Ballroom 420	Poster	1:00–4:00 PM	P2.49	Claire Menard
	Poster	1:00–4:00 PM	P2.50	Madeline Miles
	Poster	1:00–4:00 PM	P2.51	Madison Morsch
	Poster	1:00–4:00 PM	P2.52	Lucian Murray
	Poster	1:00–4:00 PM	P2.53	Kimberly Nelso
	Poster	1:00–4:00 PM	P2.54	Megan Norris
	Poster	1:00–4:00 PM	P2.55	Alex O'Neill
	Poster	1:00–4:00 PM	P2.56	Jayvaughn Oliver
	Poster	1:00–4:00 PM	P2.57	Hayley Perusek
	Poster	1:00–4:00 PM	P2.58	Alyssa Phillips
	Poster	1:00–4:00 PM	P2.59	Jennifer Pilotos
	Poster	1:00 -4:00 PM	P2.60	Nicholas Powell
	Poster	1:00–4:00 PM	P2.61	Shriya Rao
	Poster	1:00–4:00 PM	P2.62	Gregory Rapp
	Poster	1:00–4:00 PM	P2.63	Skylar Ray
	Poster	1:00–4:00 PM	P2.64	Mabel Rodriguez
	Poster	1:00–4:00 PM	P2.65	Bradford Rogers

	Mentor(s)	Title
	Dr. Matt Estep *Department of Biology*	IDENTIFYING SATELLITE REPEATS IN GRASS GENOMES
	Dr. Nicholas Shaw *Department of Chemistry*	DON'T WORRY BEE HAPPY: CLOSING THE WASTE WATER LOOP
	Dr. Denise Martz *Department of Psychology*	DEVELOPMENT OF VIGNETTES THAT EFFECTIVELY MANIPULATE WOMEN'S FAT TALK IN THE CONTEXT OF HETEROSEXUAL RELATIONSHIP
	Dr. Brooke Hester *Department of Physics and Astronomy*	A COMBINATION FLUORESCENCE ANISOTROPY AND RAMAN SPECTROSCOPY INSTRUMENT FOR OBSERVATIONS OF PROTEIN BINDING
	Dr. Maggie Sugg *Department of Geography and Planning*	"A COMPARISON BETWEEN TEMPERATURE EXPOSURE AND PHYSIOLOGICAL RISK FACTORS IN AN OCCUPATIONAL SETTING"
	Dr. Robyn Kondrad *Department of Psychology*	PRESCHOOLERS STEREOTYPE SOCIAL TRAITS MORE READILY THAN EPISTEMIC ONES
	Dr. Baker Perry *Department of Geography and Planning*	STORM SCALE ANALYSIS OF TRACE CHEMICAL AND ISOTOPIC CHARACTERISTICS OF QUELCCAYA SNOW PITS
	Dr. Jonathon Stickford *Department of Health and Exercise Science*	EXERTIONAL DYSPNEA IN YOUNG ADULTS
	Dr. Nicholas Shaw *Department of Chemistry*	SYNTHESIS OF ACETAMINOPHEN USING NANO-REACTORS
	Dr. Matt Estep *Department of Biology*	CYTOGENETIC TOOLS TO INVESTIGATE THE COMPILOSPECIES
	Dr. Michael Opata *Department of Biology*	EFFECT OF MORINGA OLEIFERA ON IMMUNE RESPONSE TO MALARIA INFECTION, MALARIA IMMUNITY, AND MALNUTRITION
	Dr. Jamie Levine *Department of Geological and Environmental Sciences*	MICROSTRUCTURAL IMPLICATIONS ON CONDITIONS OF DOMING IN THE TOXAWAY DOME, EASTERN BLUE RIDGE
	Dr. Kevin Zwetsloot *Department of Health and Exercise Science*	EXERCISE CHARACTERISTICS IN MITOCHONDRIAL CATALASE OVEREXPRESSING MICE
	Dr. Brooke Hester *Department of Physics and Astronomy*	CREATING AND DETECTING NANO-PRESSURE WAVES WITH OPTICAL TWEEZERS
	Dr. Steve Hageman *Department of Geological and Environmental Sciences*	COMPARISON OF MODERN ATLANTIC SHELF SEDIMENTS TO CAMBRIAN (515 Ma) CLASTIC SEDIMENTARY ROCKS IN THE SOUTHERN APPALACHIANS
	Dr. Lisa McAnulty *Department of Nutrition and Healthcare Management*	DEVELOPMENT OF INTAKE DOCUMENTATION TOOL FOR ORAL NUTRITION SUPPLEMENTS: A QUALITY IMPROVEMENT PROJECT
	Dr. Matt Estep *Department of Biology*	DETERMINATION OF APPALACHIAN PLANT COMMUNITIES BY AMBIENT TEMPERATURE AND LIGHT

AFTERNOON (1:00 PM - 4:00 PM)

Room	Session	Time	#	Presenter(s)
Parkway Ballroom 420	Poster	1:00–4:00 PM	P2.66	Dylan Rudisill
	Poster	1:00–4:00 PM	P2.67	Delaney Ryan
	Poster	1:00–4:00 PM	P2.68	Marissa Sariol-Clough
	Poster	1:00–4:00 PM	P2.69	Laura Sarsony
	Poster	1:00–4:00 PM	P2.70	Savanna Sheridan
	Poster	1:00–4:00 PM	P2.71	Lucas Smith
	Poster	1:00–4:00 PM	P2.72	Hannah Snyder
	Poster	1:00–4:00 PM	P2.73	Chris Stevens
	Poster	1:00–4:00 PM	P2.74	Samantha Steyl
	Poster	1:00–4:00 PM	P2.75	Franchesca Uribe Rheinbolt
	Poster	1:00–4:00 PM	P2.76	Dallas Welborn
	Poster	1:00–4:00 PM	P2.77	Jennifer Wuerffel

	Mentor(s)	Title
	Dr. Laura McArthur *Department of Nutrition and Healthcare Management*	PREVALENCE AND CORRELATES OF FOOD INSECURITY AMONG UNDERGRADUATES AT APPALACHIAN STATE UNIVERSITY: A GENDER ANALYSIS
	Dr. Steve Hageman *Department of Geological and Environmental Sciences*	THE GOBE IN THE SOUTHERN APPALACHIAN MOUNTAINS: A RECORD OF INVERTEBRATE FOSSIL MORPHOLOGY DISPARITY
	Dr. Robyn Kondrad *Department of Psychology*	FOLLOW MY POINT?: PRESCHOOLERS' EXPECTATIONS ABOUT VERIDICALITY DISRUPT THEIR UNDERSTANDING OF DECEPTIVE POINTS
	Dr. Amy Galloway *Department of Psychology*	EFFECTS OF GENDER AND AGE WITHIN DISGUST SENSITIVITY
	Dr. Mary Kinkel *Department of Biology*	FEEDING BEHAVIOR OF LARVAL ZEBRAFISH
	Dr. Rachel Smith *Department of Physics and Astronomy*	EXPLORING 12CO/13CO ICE-GAS FRACTIONATION THROUGH INTERSTELLAR ICE-ANALOGUE EXPERIMENTS
	Dr. Jonathon Stickford *Department of Health and Exercise Science*	INDICES OF AIRWAY FUNCTION IN IN-SEASON COLLEGIATE SWIMMERS OVER EIGHT WEEKS
	Mr. Brent Summerville *Department of Sustainable Technology and the Built Environment*	TESTING THE RUGGEDNESS OF A SMALL, MOBILE PHOTOVOLTAIC SYSTEM TO PRODUCE RECREATIONAL WATTAGE FOR OFF GRID APPLICATIONS FOR COMMUNITY ENGAGEMENT
	Dr. Brooke Christian *Department of Chemistry*	OVEREXPRESSION OF MANGANESE SUPEROXIDE DISMUTASE IN MOUSE LIVER LEADS TO DEFECTS IN OXIDATIVE PHOSPHORYLATION
	Dr. Jennifer Cecile *Department of Chemistry*	CHROMATOGRAPHIC SEPARATION OF PHOTOCHEMICALS IN MORINGA OLEIFERA LEAVES
	Dr. Nicholas Shaw *Department of Chemistry*	SYNTHESIS OF ETHYL AND PROPYL FATTY ACID ESTERS IN NANO-REACTORS
	Dr. Margaret Barth *Department of Nutrition and Healthcare Management*	DEVELOPMENT OF EVIDENCE-BASED NUTRITION EDUCATION MATERIALS TO MEET THE NEEDS OF CLINICAL PROFESSIONALS WORKING WITH CHILDREN AND FAMILIES AT AUTISM CARE FACILITIES THROUGHOUT CHINA

Art

- Mellanee Goodman, Faculty Mentor: Jody Servon
- Veda Stocton, Faculty Mentor: Mira Waits

Subtotal: 2

Biology

- Logan Clark, Faculty Mentor: Matt Estep
- Hunter Cox, Faculty Mentor: Matt Estep
- Tierney Daw, Faculty Mentor: Mary Kinkel
- Mary Butler Fleming, Faculty Mentor: Matt Estep
- Allison Griggs, Faculty Mentor: Cara Fiore
- Jessie Hatcher, Faculty Mentor: Matt Estep
- Rachel Jordan, Faculty Mentor: Howard Neufeld
- Katie Krogmeier, Faculty Mentor: Matt Estep
- Melanie Mcmillan, Faculty Mentor: Ian Snider
- Claire Menard, Faculty Mentor: Matt Estep
- Carmen Montero, Faculty Mentor: Darren Seals
- Alyssa Phillips, Faculty Mentor: Matt Estep
- Lucas Piedrahita, Faculty Mentor: Jennifer Geib
- Bradford Rogers, Faculty Mentor: Matt Estep
- Savanna Sheridan, Faculty Mentor: Mary Kinkel
- Dalton Sizemore, Faculty Mentor: Darren Seals
- Maggie Smith, Faculty Mentor: Michael Opata
- Douglas Watson, Faculty Mentor: Annakatrin Rose

Subtotal: 18

Chemistry

- Angelina Azieva, Faculty Mentor: Nicholas Shaw
- Cassidy Chapman, Faculty Mentor: Nicholas Shaw
- Morgen Dugan, Faculty Mentor: Nicholas Shaw
- Ethan Finlay, Faculty Mentor: Nicholas Shaw
- Lydia Harris, Faculty Mentor: Megen Culpepper
- Hayden Lane, Faculty Mentor: Jefferson Bates
- Samantha Malone, Faculty Mentor: Nicholas Shaw
- Madeline Miles, Faculty Mentor: Nicholas Shaw
- Hayley Perusek, Faculty Mentor: Nicholas Shaw
- Samantha Steyl, Faculty Mentor: Brooke Christian
- Franchesca Uribe Rheinbolt, Faculty Mentor: Jennifer Cecile
- Dallas Welborn, Faculty Mentor: Nicholas Shaw
- Amber Woodington, Faculty Mentor: Nicholas Shaw

Subtotal: 13

Communication

- Jessica Barker, Faculty Mentor: Newly Paul
- Audrey Everett, Faculty Mentor: Valerie Wieskamp
- Jaelyn Felder, Faculty Mentor: Newly Paul
- Mariah Reneau, Faculty Mentor: Chris Patti

Subtotal: 4

Computer Science

- Karen Gibson, Faculty Mentor: Mohammad Mohebbi
- Nathan Potvin, Faculty Mentor: Mohammad Mohebbi

Subtotal: 2

Cultural, Gender and Global Studies

- Sarah Booze, Faculty Mentor: Jeanne Dubino
- Lily Shaw, Faculty Mentor: Joseph Gonzalez

Subtotal: 2

Geography and Planning

- Danielle Boase, Faculty Mentor: Maggie Sugg
- Kimberly Nelson, Faculty Mentor: Maggie Sugg
- Alex O'Neill, Faculty Mentor: Baker Perry
- Matthew Wilson, Faculty Mentor: Maggie Sugg

Subtotal: 4

Geological and Environmental Science

- Morgan Baker, Faculty Mentor: Gabriele Casale
- Tristan BeDell, Faculty Mentor: Jamie Levine
- Nickolas Brand, Faculty Mentor: Andrew Heckert
- Kevin Bynum, Faculty Mentor: Cynthia Liutkus-Pierce
- William Cheek, Faculty Mentor: William Anderson
- Austin Deans, Faculty Mentor: Andrew Heckert
- Yanelis Delgado, Faculty Mentor: Andrew Heckert
- Jacob Dorsett, Faculty Mentor: Scott Marshall
- Matthew Eads, Faculty Mentor: Andrew Heckert
- Emily Fedders, Faculty Mentor: William Anderson
- Glen Gonzalez, Faculty Mentor: Andrew Heckert
- Daniel Govert, Faculty Mentor: Cole Edwards
- Nicholas Hammond, Faculty Mentor: Sarah Evans
- Amanda Hendrix, Faculty Mentor: Andrew Heckert
- William Lamb, Faculty Mentor: Cole Edwards
- Carly Maas, Faculty Mentor: William Anderson
- Kayla Mitchell, Faculty Mentor: Ellen Cowan
- Olivia Paschall, Faculty Mentor: Sarah Carmichael
- Nicholas Powell, Faculty Mentor: Jamie Levine
- Skyler Ray, Faculty Mentor: Steve Hageman
- Delaney Ryan, Faculty Mentor: Steve Hageman

Subtotal: 21

Government and Justice Studies

- Enzo Codella, Faculty Mentor: Barbara Zaitzow
- Seth Fraser, Faculty Mentor: Tammatha Clodfelter
- Shaina Katz, Faculty Mentor: Cary Fraser
- Emma Labovitz, Faculty Mentor: Renee Scherlen

Subtotal: 4

Health and Exercise Science

- Peyton Attaway, Faculty Mentor: Erin Bouldin
- Margaret Bennett, Faculty Mentor: Adam Hege
- Megan Campany, Faculty Mentor: Scott Collier
- Anna Ruth Carmichael, Faculty Mentor: Rebecca Kappus
- Amber L. Daniel, Faculty Mentor: Alex F. Howard
- Jena Donovan, Faculty Mentor: Alan Needle
- Mary Clare Gabel, Faculty Mentor: Christopher Seitz
- Charleston Gaillard, Faculty Mentor: Kevin Zwetsloot
- William Johnson, Faculty Mentor: Kevin Zwetsloot
- Vanna Labi, Faculty Mentor: Richard Christiana
- Austin Lubkemann, Faculty Mentor: Scott Collier
- Victoria Nothnagel, Faculty Mentor: Alan Needle
- Shriya Rao, Faculty Mentor: Kevin Zwetsloot
- Danna Rodriguez, Faculty Mentor: Abigail Stickford
- Emma Taylor, Faculty Mentor: Abigail Stickford
- Elizabeth Watson, Faculty Mentor: Alan Needle

Subtotal: 16

History

- Mary Kate McCann, Faculty Mentor: Michael Behrent

Subtotal: 1

Leadership and Educational Studies

- John Leppard, Faculty Mentor: Paul Wallace

Subtotal: 1

Mathematical Sciences

- Kelly Loucks, Faculty Mentor: Eric Marland

Subtotal: 1

Physics and Astronomy

- Claire Brown, Faculty Mentor: Brooke Hester
- Jeffrey Miller, Faculty Mentor: Brooke Hester
- Lucian Murray, Faculty Mentor: Brooke Hester
- Forrest Myers, Faculty Mentor: Brooke Hester
- Gregory Rapp, Faculty Mentor: Brooke Hester
- Lucas Smith, Faculty Mentor: Rachel Smith

Subtotal: 6

Psychology

- Yasmin Ayala-Johnson, Faculty Mentor: Yalcin Acikgoz
- Kristin Collins, Faculty Mentor: Yalcin Acikgoz
- Katelyn Currie, Faculty Mentor: Amy Galloway
- Logan Ellis, Faculty Mentor: Yalcin Acikgoz
- Jarod Fyler, Faculty Mentor: Yalcin Acikgoz
- Margaret Hancock, Faculty Mentor: Robyn Kondrad
- Michaela Kirby, Faculty Mentor: Rose Mary Webb
- Madison Morsch, Faculty Mentor: Denise Martz
- Laura Sarsony, Faculty Mentor: Amy Galloway

Subtotal: 9

Recreation Management and Physical Education

- Emily Cluen, Faculty Mentor: Joy James
- Annie Pharr, Faculty Mentor: Joy James

Subtotal: 2

Social Work

- Lyndsay Wilcox, Faculty Mentor: Peter Fawson

Subtotal: 1

Sustainable Technology and the Built Environment

- Katie Lorenzini, Faculty Mentor: Jason Hoyle

Subtotal: 1

Theatre and Dance

- Alison Bird, Faculty Mentor: Marianne Adams

Subtotal: 1

Watauga Residential College

- Daniel Brehm, Faculty Mentor: Clark Maddux

Subtotal: 1

Biology

- Whitney Bond, Faculty Mentor: Ece Karatan
- Garett Bonds, Faculty Mentor: Ece Karatan
- Byron Burrell, Faculty Mentor: Matt Estep
- Kitt Franse, Faculty Mentor: Mary Kinkel
- Gita Gajjar, Faculty Mentor: Andrew Bellemer
- Katie Hahn, Faculty Mentor: Cortney Bouldin
- Katherine Hoffman, Faculty Mentor: Andrew Bellemer
- Jessica McCanless, Faculty Mentor: Maryam Ahmed
- Haley McGuirt, Faculty Mentor: Andrew Bellemer
- Jennifer Pilotos, Faculty Mentor: Michael Opata
- Tyler Pyle, Faculty Mentor: Lynn Siefferman
- Marietta Shattelroe, Faculty Mentor: Matt Estep
- Jamison Slate, Faculty Mentor: Maryam Ahmed
- Megan Tennant, Faculty Mentor: Ted Zerucha
- Adam Willits, Faculty Mentor: Andrew Bellemer
- Erin Young, Faculty Mentor: Ece Karatan

Subtotal: 16

Geography and Planning

- Lauren Andersen, Faculty Mentor: Maggie Sugg
- Elizabeth Bailey, Faculty Mentor: Maggie Sugg
- Elizabeth Goughnour, Faculty Mentor: Baker Perry
- Heather Guy, Faculty Mentor: Baker Perry
- Tania Katherine Ita Vargas, Faculty Mentor: Baker Perry
- Joseph Jonaitis, Faculty Mentor: Baker Perry
- April Kaiser, Faculty Mentor: Saskia van de Gevel
- Evan Montpellier, Faculty Mentor: Peter Soulé
- Zachary Osborne, Faculty Mentor: Saskia van de Gevel
- Laura Thompson, Faculty Mentor: Maggie Sugg

Subtotal: 10

Government and Justice Studies

- Erin Bishop, Faculty Mentor: Tatyana Ruseva

Subtotal: 1

Health and Exercise Science

- Kathryn Farina, Faculty Mentor: Herman van Werkhoven
- Joshua Godwin, Faculty Mentor: Andrew Shanely
- Taylor Goodman, Faculty Mentor: Abigail Stickford
- Charlie Hodgman, Faculty Mentor: Kevin Zwetsloot
- Erica Larson, Faculty Mentor: Andrew Shanely
- John Mackall, Faculty Mentor: Alan Needle
- Wilton Norris, Faculty Mentor: Herman van Werkhoven
- Jayvaughn Oliver, Faculty Mentor: Jonathon Stickford
- Hannah Snyder, Faculty Mentor: Jonathon Stickford

Subtotal: 9

Languages, Literatures and Cultures

- Courtney Roberts, Faculty Mentor: Darci Gardner

Subtotal: 1

Nutrition and Healthcare Management

- Jessica Barnwell, Faculty Mentor: Margaret Barth
- Ashley Childers, Faculty Mentor: Martin Root
- Abigale Clapham, Faculty Mentor: Martin Root
- Emily Curlin, Faculty Mentor: Martin Root
- Katharine Garrity, Faculty Mentor: Melissa Gutschall
- Cameron Hubbard, Faculty Mentor: Melissa Gutschall
- Kathleen Jablonski, Faculty Mentor: Martin Root
- Kelsey Johnson, Faculty Mentor: Melissa Gutschall
- Jordan Miller, Faculty Mentor: Laura McArthur
- Julieanne Pike, Faculty Mentor: Lisa McAnulty
- Mabel Rodriguez, Faculty Mentor: Lisa McAnulty
- Dylan Rudisill, Faculty Mentor: Laura McArthur
- Caroline Sharrits, Faculty Mentor: Lisa McAnulty
- Corinne Spiczenski, Faculty Mentor: Melissa Gutschall
- Christopher Thompson, Faculty Mentor: Kyle Thompson
- Elaine Wartinger, Faculty Mentor: Laura McArthur
- Desa Wells, Faculty Mentor: Margaret Barth
- Virginia Woollens, Faculty Mentor: Margaret Barth
- Jennifer Wuerffel, Faculty Mentor: Margaret Barth

Subtotal: 19

Office of Sustainability

- Jacob Meadows, Faculty Mentor: Lee Ball

Subtotal: 1

Physics and Astronomy

- Michael Paolino, Faculty Mentor: Brooke Hester

Subtotal: 1

Psychology

- Cameron Brown, Faculty Mentor: Shawn Bergman
- Ciera Ferrone, Faculty Mentor: Twila Wingrove
- Rebekah Knight, Faculty Mentor: Lisa Emery
- Cassidy Miles, Faculty Mentor: Denise Martz
- Megan Norris, Faculty Mentor: Robyn Kondrad
- Marissa Sariol-Clough, Faculty Mentor: Robyn Kondrad

Subtotal: 6

Sociology

- Zachary Kopkin, Faculty Mentor: Robert Perdue

Subtotal: 1

Sustainable Technology and the Built Environment

- Chris Stevens, Faculty Mentor: Brent Summerville

Subtotal: 1

Art

- Jody Servon
- Mira Waits

Subtotal: 2

Biology

- Maryam Ahmed
- Andrew Bellemer
- Cortney Bouldin
- Matt Estep
- Cara Fiore
- Jennifer Geib
- Ece Karatan
- Mary Kinkel
- Howard Neufeld
- Michael Opata
- Annakatrin Rose
- Darren Seals
- Lynn Siefferman
- Ian Snider
- Ted Zerucha

Subtotal: 15

Chemistry

- Jefferson Bates
- Jennifer Cecile
- Brooke Christian
- Megen Culpepper
- Nicholas Shaw

Subtotal: 5

Communication

- Chris Patti
- Newly Paul
- Valerie Wieskamp

Subtotal: 3

Computer Information Systems

- Mohammad Mohebbi

Subtotal: 1

Cultural, Gender and Global Studies

- Jeanne Dubino
- Joseph Gonzalez

Subtotal: 2

Geography and Planning

- Baker Perry
- Peter Soulé
- Maggie Sugg
- Saskia van de Gevel

Subtotal: 4

Geological and Environmental Science

- William Anderson
- Sarah Carmichael
- Gabriele Casale
- Ellen Cowan
- Cole Edwards
- Sarah Evans
- Steve Hageman
- Andrew Heckert
- Jamie Levine
- Cynthia Liutkus-Pierce
- Scott Marshall

Subtotal: 11

Government and Justice Studies

- Tammatha Clodfelter
- Cary Fraser
- Tatyana Ruseva
- Renee Scherlen
- Barbara Zaitzow

Subtotal: 5

Health and Exercise Science

- Erin Bouldin
- Richard Christiana
- Scott Collier
- Adam Hege
- Alex F. Howard
- Rebecca Kappus
- Alan Needle
- Christopher Seitz
- Andrew Shanely
- Abigail Stickford
- Jonathon Stickford
- Herman van Werkhoven
- Kevin Zwetsloot

Subtotal: 13

History

- Michael Behrent

Subtotal: 1

Languages, Literatures and Cultures

- Darci Gardner

Subtotal: 1

Leadership and Educational Studies

- Paul Wallace

Subtotal: 1

Mathematical Sciences

- Eric Marland

Subtotal: 1

Nutrition and Healthcare Management

- Margaret Barth
- Melissa Gutschall
- Lisa McAnulty
- Laura McArthur
- Martin Root
- Kyle Thompson

Subtotal: 6

Office of Sustainability

- Lee Ball

Subtotal: 1

Physics and Astronomy

- Brooke Hester
- Rachel Smith

Subtotal: 2

Psychology

- Yalcin Acikgoz
- Shawn Bergman
- Lisa Emery
- Amy Galloway
- Robyn Kondrad
- Denise Martz
- Rose Mary Webb
- Twila Wingrove

Subtotal: 8

Recreation Management and Physical Education

- Joy James

Subtotal: 1

Social Work

- Peter Fawson

Subtotal: 1

Sociology

- Robert Perdue

Subtotal: 1

Sustainable Technology and the Built Environment

- Jason Hoyle
- Brent Summerville

Subtotal: 2

Theatre and Dance

- Marianne Adams

Subtotal: 1

Watauga Residential College

- Clark Maddux

Subtotal: 1


Office of Student Research
APPALACHIAN STATE UNIVERSITY

ART

Mellanee Goodman, Art, Undergraduate

RADICAL FEMINISTS

Faculty Mentor: Jody Servon, Fine and Applied Arts

Radical Feminist was a group exhibition that promoted feminisms as a political movement, emphasized the importance of feminism and examined experiences of women, particularly women of color, whose voices are often unheard in the art community. The premise of Radical Feminist was based on literature written by feminist activist and authors whose work defines feminism, expresses the importance of feminism and showcased the power of feminism, thus the exhibition was heavily based on feminist theory. Specifically the exhibition referenced the works of Bell Hooks, Alice Walker, Judith Lorber, Jennifer Weiss-Wolf and third and forth wav feminist readings from Bitch Media, Womankind and more. Radical Feminists addressed feminism in a practical and proactive way by using art as a toll for creating political discourse. Radical Feminist advocated for women's rights and women's health, showed feminism as a multiethnic and multicultural social movement that strived to reform the patriarchal and misogynistic characteristics that plague our nation. Radical Feminists was exhibited at the local gallery, HOW Space on January 23 - February 2nd, with a closing reception February 2nd from 6:00pm - 9:00pm. The exhibition engaged approximately 250 people of which were community members, university faculty and students, and was toured by 6 classes from the College of Fine and Applied Arts. The exhibition was also featured in the Appalachian University newspaper.

Veda Stocton, Art, Undergraduate

INDELICATE PHILOSOPHIES: THE CONVERGENCE OF FRENCH AND JAPANESE EROTIC ARTS

Faculty Mentor: Mira Waits, Fine and Applied Arts

Nineteenth-century French artists' appropriation of Japanese imagery has often been discussed as representative of orientalist practice in the West. The end of Japanese isolationist foreign policy in 1853 introduced the Western world to Japanese art and ignited a subsequent lust for the 'Japanese aesthetic.' However, there is a gap in the scholarship. French and Japanese similarities prior to their nineteenth-century contact has not been greatly discussed. My project analyzes the social, philosophical, and creative connections between France and Japan prior to 1853, specifically by focusing on each country's pornographic prints, which served as forms of social critique. I argue that erotic representations in France and Japan produced in the sixteenth and seventeenth centuries laid the foundation for their respective restorations and further artistic influence on one another. Artists from both countries were heavily engaged with representations of the nude, as well as exploring practices understood at the time as sexual deviancy. My research provides a cross-cultural perspective on politically and socially deviant art. The use of pornographic prints is assumed to be "d'une seule main," but contain as well the acute admonition of those in power through a libertine approach. This analysis is necessary since each artistic movement was tied to their respective country's impending revolutions, suggesting a correlation between fleeting pleasure and political upheaval.

BIOLOGY

Whitney Bond, Biology, Graduate

CHARACTERIZING THE DOMAINS OF THE BIOFILM REGULATING PROTEIN MBAA IN VIBRIO CHOLERAE

Faculty Mentor: Ece Karatan, Arts and Sciences

Coauthor(s): Ece Karatan

Vibrio cholerae is a pathogen that is believed to survive within its natural environment in a biofilm state but can only cause infection in a planktonic, motile state. This bacterium is able to switch between states by sensing signals within its environment. Polyamines, specifically norspermidine, spermidine, and spermine, modulate biofilm formation. All three polyamines are sensed by the periplasmic protein NspS, when NspS binds to a polyamine it is hypothesized to bind to the periplasmic region of MbaA. MbaA is an integral membrane protein that has C-terminal tandem GGDEF and EAL domains. GGDEF and EAL domains are associated with diguanylate cyclase (DGC) and phosphodiesterase (PDE) activity, respectively. DGC produce the secondary messenger c-di-GMP while PDE break down c-di-GMP. Increasing intracellular c-di-GMP enhances biofilm formation. Our lab has previously characterized MbaA as a PDE. This current study set out to determine the purpose of the GGDEF domain within MbaA. The parts of the mbaA gene that encode the GGDEF and EAL domains were amplified by PCR and then cloned into pMAL-c5x. This enabled the expression of GGDEF and EAL domains as maltose binding protein (MBP) fusions. MBP-GGDEF and MBP-EAL proteins were purified and used to determine DGC and PDE activities. High Pressure Liquid Chromatography (HPLC) was then used to determine reaction products. The EAL domain was determined to be independently functional in vitro and the GGDEF domain has no apparent activity. In vivo data is still being collected.

Garett Bonds, Biology, Graduate

THE EFFECTS OF BIOFILM FORMATION ON VIBRIO CHOLERAE COLONIZATION IN ZEBRAFISH

Faculty Mentor: Ece Karatan, Arts and Sciences

Vibrio cholerae, the intestinal pathogen responsible for the diarrheal disease cholera, is an aquatic bacterium that utilizes biofilms as an integral part of its life cycle. Biofilms are clusters of bacterial cells bound in a matrix that is self-produced. Biofilms have been shown to protect from environmental stresses, enable adhesion, and are thought to aid in the colonization its hosts. It has previously been shown that polyamines, small hydrocarbon molecules that most cells synthesize, play a role in biofilm formation.

This study aims to utilize the zebrafish model to investigate the role of polyamine synthesis, transport, signaling, and biofilm formation in colonization. Zebrafish have been used in previous colonization studies of Vibrio cholerae and are established as an effective model organism. We are comparing the colonization efficiency of wild-type bacteria with the mutant strains: ΔvpsL, ΔnspS, ΔnspC, ΔpotA, ΔpotE, and ΔspeC.

To determine colonization efficiency, approximately 109 - 1010 wild-type(lacZ+) and mutant (lacZ-)V. cholerae are added to the fish tanks, which simulates fish colonization in their native environment. After 24 hours, fish are euthanized, and the intestines are removed and plated on selective and differential media to quantify the number of wild-type and mutant strains.

Results of this study should increase our knowledge of genetic determinants of V. cholerae that are key to survival and transmission via biofilms in the aquatic environment

Byron Burrell, Biology, Graduate

HABITAT PREFERENCE AND HERBIVORY EFFECTS IN A RARE PLANT PRESERVE WITH REDUCED HUMAN INTERACTION

Faculty Mentor: Matt Estep, Arts and Sciences

Coauthor(s): Matt C. Estep

White-tailed deer (Odocoileus virginianus) populations has been increasing across the country in light of their near-extirpation at the beginning of the 20th century. Due to this recovery, there has been serious concerns as to what ecological, economic, and social impacts may occur. This study utilizes trail camera technology and determines species richness, habitat selection, to what degree habitat is exploited by wildlife, and describes potential herbivory of rare plant communities. The study focuses on a natural habitat where limited amounts of human interaction has occurred for nearly 40 years. The 486-hectare Tater Hill Plant Preserve of Watauga County, NC, currently protects more than 20 rare and state listed species of plants from development and human encroachment. The Tater Hill Plant Preserve habitats range from high elevation rock outcrops, rich cove forest, northern hardwood forest, to mountain bog ecosystems. Trail camera technology was paired with ArcGIS software to understand patterns of activity and interpolation of potential herbivory effects. White-tailed deer occupancy of area was calculated along with interpretation of animal's actions while within selected habitat. This information can assist conservation in determining areas to focus resources and provides a better understanding of potential ecological barriers to recovery.

Logan Clark, Biology, Undergraduate

DEVELOPMENT OF MICROSATELLITE MARKERS TO EVALUATE CURRENT SPECIES BOUNDARIES BETWEEN LIATRIS HELLERI PORTER AND LIATRIS TURGIDA GAISER

Faculty Mentor: Matt Estep, Arts and Sciences

Coauthor(s): Matt C. Estep

For this project I aim to develop a 16 microsatellite markers to for a genetic study of Liatris helleri Porter and L. turgida Gaiser to assess genetic diversity, population structure, and taxonomic identity of the two species. L. helleri, commonly known as Heller's Blazing Star, is a federally endangered perennial herb endemic to high elevation rock outcroppings in western NC. L. turgida, also known as the Shale Barren's Blazing Star, is found commonly along mid-elevation shale barrens throughout VA, WV, and NC. These species have a history of taxonomic contention, with the most recent morphological analysis suggesting that L. helleri and L. turgida represent a singular, common and wide-ranging species. If L. helleri does constitute a broader species than previously listed, its federal status will likely be reevaluated and removed from protection. I aim to address the taxonomic issue surrounding L. helleri by developing a series of microsatellite markers in order to genotype 30 individuals from extant populations of L. helleri as well as populations of L. turgida in WV, NC, and VA. I will. I will use this data to calculate genetic distance values, such as Fst, Rst, Gst, and allelic diversity. I will also perform a Bayesian STRUCTURE analysis to identify distinct genetic identities within the taxa. This research will provide evidence toward resolving the taxonomic identity of L. helleri, which has important conservation management decision implications in the rare habitats where it is found.

Hunter Cox, Biology, Undergraduate

ANALYSIS OF CAMERA PLACEMENT FOR VERTEBRATE SURVEYS AND OTHER ECOLOGICAL STUDIES

Faculty Mentor: Matt Estep, Arts and Sciences

Coauthor(s): Byron Burrell, Matt Estep

Camera trapping has become a popular tool in studying populations over large spatial scales. Many methods have been developed to improve the accuracy of cameras, and as the use of these methodologies expand, we see a need to dive further into how the placement and angle of a camera can affect the data collected. Our design was to deploy 2 sets of 4 cameras in 2 locations for 2 weeks at a time. Two of the cameras were placed above the average vegetation height, and two were placed around the average vegetation height. A single camera from each of the heights was tilted at a 45° angle towards the ground. This design has been repeated at 6 locations. The locations for each deployment were generated through ArcGIS and covered a number of habitats and elevations of up to 5400 ft. Results from this camera trap study will be presented to further refine the effectiveness of camera trapping.

Tierney Daw, Biology, Undergraduate

OPTIMIZING USE OF ARTEMIA AS A FOOD SOURCE FOR LARVAL ZEBRAFISH

Faculty Mentor: Mary Kinkel, Arts and Sciences

Coauthor(s): Alena Norton, Mary Kinkel

This project evaluates morphometrics of two Artemia franciscana strains, the San Francisco Bay and Great Salt Lake strains. Length, width and volume of shrimp are being measured to understand whether there is a size difference between the strains and at which stages of development. This project is part of a larger project that studies intestinal physiology using the zebrafish model. Artemia are used as a food source for larval zebrafish, however there is debate in the literature over which strain and developmental stage is ideal to best promote growth and nutrition for zebrafish. We determined that Artemia show no length differences between the strains when they are newly-hatched. Size differences become apparent after 24 hours post-hatching, when the GSL strain grows significantly in length. We used newly-hatched Artemia to test strategies for perfecting the feeding regimen and imaging of larval zebrafish. The density of Artemia in a Pasteur pipette was tested to determine the volume of shrimp to be administered to each tank, based on the population size of zebrafish in the tanks. We also determined optimum lighting conditions for imaging different food sources in the zebrafish gut, including powdered formulated feeds and live Artemia. Our studies show that a single Artemia can be imaged through the body wall of live larval zebrafish. These studies are predicted to improve our ability to control feeding and imaging across our studies of gut function in the zebrafish model.

Mary Butler Fleming, Biology, Undergraduate

GIS MAPPING AND HABITAT DELINEATION OF THE TATER HILL FEN (BOG)

Faculty Mentor: Matt Estep, Arts and Sciences

Coauthor(s): Matt Estep

The successional dynamics of Southern Appalachian fens remain a mystery to the scientific community. This habitat is home to many rare or endangered plants, such as Gray's Lilly, and American fly-honeysuckle. The Tater Hill Plant Preserve in Watauga county NC provides an opportunity to study the successional dynamics. To measure and record the successional dynamics occurring within the boundaries of the fen, a GPS is used to record a variety of tracks within the area, representing various features. Combining these tracks with water quality data from the NC DEQ's groundwater monitoring system located within the fen will allow us to examine fluid changes between terrestrial and aquatic habitats that can be modeled digitally over time. The presence of beavers has been noted, dens have been located along with respective territories. Through meeting their basic needs of shelter and food, beavers are morphing the fen on Tater Hill. Evidence of habitat change has been observed through recording changes in territory sizes and locations, water flow, and relative depth. Subsequent changes of flooding by beavers has decreased canopy cover, increased the amount of flooded land, and has allowed the formation of new terrestrial habitats through the increase of sphagnum moss beds. The digital model will allow us to predict the future species ranges resulting from water flow dynamics, as well as aiding in conservation and protection of the rare plants occurring within the fen.

Kitt Franse, Biology, Graduate

INTESTINAL ADAPTATION: THE ADULT ZEBRAFISH AS A MODEL FOR HUMAN INTESTINAL EXPLORATION

Faculty Mentor: Mary Kinkel, Arts and Sciences

Coauthor(s): Mary Kinkel

The purpose of this study is to establish zebrafish as a model organism for intestinal motility disorders in humans. Zebrafish provide a high throughput model that allows for the examination of the intestine throughout the life of an organism. It is already known that zebrafish share a high degree of homology with the human intestine and much is known about the intestines of larval zebrafish and adult zebrafish. Part of this investigation will include understanding the adaptations of the intestine during feeding and fasted states. One such phenomenon involves topographical changes to the surface of the intestine due to fasting/feeding. Villi are the fingerlike projections along the intestinal wall that increase the surface area of the intestine, thus increasing interaction with luminal contents. Villi heights are known to change with fasting and refeeding (Yamauchi 1997). Using Scanning Electron Microscopy (SEM), we would like to observe this phenomenon in the zebrafish intestine. Zebrafish also have rudimentary structures to increase surface area known that are analogous to villi as Villar ridges (Ng 2005). The results of this study will serve to inform future studies and the resulting data generated from transit times of the intestine and the effects of fasting zebrafish.

Gita Gajjar, Biology, Graduate

THE ROLE OF THE EIF4F COMPLEX IN NOCICEPTOR SENSITIVITY

Faculty Mentor: Andrew Bellemer, Arts and Sciences

Coauthor(s): Andrew Bellemer

Nociception refers to detection of noxious mechanical, chemical, or thermal stimuli by specialized neurons called nociceptors. Sensitization of these nociceptor neurons in response to tissue damage or inflammation is root cause of chronic pain. Pain modifies the way in which our central nervous system works. With over 1.5 billion people worldwide suffering chronic pain, understanding how neural plasticity occurs in nociceptors can help in the mediation of chronic pain. Nociception is likely regulated by synthesis of new proteins in nociceptors. Thus my project seeks to understand the protein translations that are happening using the eukaryotic initiation factor (eIF4F) specifically eIF4G, eIF4A and the eIF4E-BP, which are proteins involved in translation initiation of protein in the nociceptors leading to sensitization. The project uses larvae of Drosophila as model organism as it exhibits quantifiable nocifensive escape locomotion response and is useful tool for identifying conserved genes required for pain and pain sensitization. Using tissue specific expression drivers in the nociception neurons, different fly RNAi lines are reared with knockdown genes of interest and tested using thermal, mechanical and hypersensitization assay. Preliminary mechanical and thermal results show that eIF4G significantly affect the sensitization process but eIF4E-BP does not. Further analysis using hypersensitization may produce more insight into the neural plasticity in chronic pain.

Allison Griggs, Biology, Undergraduate

FRESHWATER SPONGES ARE PREVALENT IN WESTERN NORTH CAROLINA AND HOST DIVERSE MICROBIAL SYMBIONTS

Faculty Mentor: Cara Fiore, Arts and Sciences

Coauthor(s): David Corcoran, Victoria Skelly, Christina Strobel, Cole Easson, Cara Fiore

Sponges are common in freshwater bodies around the world, but they are dramatically understudied compared to their marine counterparts. Because of this, data on freshwater sponge species distribution and ecological attributes are patchy and there are limited data on microbial symbionts of these sponges, a generally well-characterized phenomenon in marine sponges. Here, we identified several freshwater sponge species from rivers in western North Carolina and have begun monitoring physical and chemical factors that may influence their distribution and abundance in the region. We also we investigated the composition of the prokaryotic community for two abundant sponge species from western N.C. As many marine sponges contain diverse prokaryotic symbionts that influence the ecological role of the sponge host in its habitat, we aimed to determine if a similar phenomenon exists for freshwater sponges. Separate individual sponges and river water were sampled for microbiome analysis from May to August, capturing potential seasonal variation in symbiont composition. Freshwater sponges analyzed here contained surprisingly diverse microbial communities, including potentially sponge-enriched microbial taxa. Additionally, the microbial communities of the sponges contained different microbial taxa than observed in the river water. The data presented here represents the first of its kind from the region and provides a foundation for future investigations into the biodiversity and ecological role of sponges in montane riverine habitat.

Katie Hahn, Biology, Graduate

CHARACTERIZING A TRANSGENIC LINE THAT DELAYS THE FIRST GAP PHASE OF THE CELL CYCLE

Faculty Mentor: Cortney Bouldin, Arts and Sciences

Coauthor(s): Cortney Bouldin

Stem cells have a unique cell cycle, which consists of a short G1, or gap 1 phase, and a long G2, or gap 2 phase, that is hypothesized to play an important role in a stem cell's ability to make decisions about cell fate. More specifically, the length of G1 has been shown in vitro to directly affect cell fate decisions in stem cells. To study the importance of a short G1 in vivo, our lab uses a transgenic line of zebrafish that can prolong the length of G1 using a mutated version of a cell cycle factor, cyclin D, which cells require to move through G1 and into the synthesis phase of the cell cycle. The mutated form of cyclin D (ccnd1DN) is expressed under the control of a heat shock promoter that allows for temporal control of transcription of the transgene and activation of a delayed G1 at different time points in development. Understanding the kinetics of the transgene, as in when after heat shock is the RNA transcribed and where in the cells are the proteins being expressed, is important for using the transgenic line in research. Our lab has previously used in situ hybridization to establish the location and timing of ccnd1DN RNA expression. In addition, western blots and immunofluorescence will be used to look at location and timing of the ccnd1DN protein expression in cells. These experiments will allow the line to be used to study the effects of a prolonged G1 in vivo.

Jessie Hatcher, Biology, Undergraduate

DEVELOPMENT OF MICROSATELLITE MARKERS FOR DIVERSITY STUDIES WITHIN THE GENUS DICENTRA.

Faculty Mentor: Matt Estep, Arts and Sciences

Coauthor(s): Lindsay Shields, Matt C. Estep

The genus Dicentra (Fumariaceae, Bernhardi) is a small clade of herbaceous plants containing seven species in North America and one species in eastern Asia. Three species; D. eximia, D. cucullaria, and D. canadensis exhibit a polyploid series in the Southern Appalachians, where D. eximia is a diploid (2N=16), D. cucullaria is a tetraploid (2N=32) and D. canadensis is an octoploid (2N=64). To examine genetic diversity and species boundaries within the polyploid series, microsatellite markers are being developed. DNA from D. cucullaria was sequenced on an illumina sequencer, resulting in 533,116 sequences. These sequences were searched for microsatellite motifs using MSATcommander software. We identified 10,717 microsatellite motifs within the sequence data and designed primers for 50 loci. Primer pairs were screened against seven DNA samples from D.cucullaria or D. canadensis. Seventeen of the fifty primer pairs successfully amplified a single locus based on 1% gel electrophoresis. These primers were used to fluorescently label PCR products for fine resolution genotyping on an ABI3730 sequencer. Chromatograms of the products were produced and analyzed, but we found scoring the multiple peaks of polyploids difficult. Therefore, we have included D. eximia (2N) to verify peak patterns and further refine the molecular markers.

Katherine Hoffman, Biology, Graduate

PROTEIN SYNTHESIS REGULATORS CONTROL SENSORY NEURON SENSITIVITY IN DROSOPHILA MELANOGASTER LARVAE

Faculty Mentor: Andrew Bellemer, Arts and Sciences

Nociception is the detection harmful stimuli that is enabled by specialized somatosensory neurons that are activated by harmful (noxious) stimuli. Though this physiological process is essential for survival, the dysregulation of nociception is thought to be the origin of chronic pain, a disease that ails over 100 million Americans. To understand the pathogenesis of chronic pain, the mechanisms that control nociceptor sensitivity must first be defined. The fruit fly, Drosophila, is an excellent model organism to investigate the mechanisms of nociception. When Drosophila larval nociceptors are activated by a noxious stimulus, the larvae produce a defensive rolling behavior that can be used to quantify their sensitivity the stimulus. Mammalian and fly studies have demonstrated that functional RNA-binding proteins that control protein synthesis, the eukaryotic initiation factors (eIFs), play a critical role in normal nociception. My research focuses on the eIF4E and eIF4AIII proteins which intricately regulate local protein synthesis in nociceptor neurons. When expression of these proteins is decreased using nociceptor-specific RNA interference, larvae are insensitive to noxious stimuli which suggests that nociceptors rely on local translation for proper function. Future identification of the where these RNA-binding proteins localize in the neuron and what their target mRNA transcripts are will deepen our understanding of the mechanisms responsible for nociception.

Rachel Jordan, Biology, Undergraduate

COMPARATIVE ECOPHYSIOLOGY OF TWO HIGH ELEVATION CONIFERS IN THE SOUTHERN APPALACHIANS: THE IMPORTANCE OF THE WINTER SEASON

Faculty Mentor: Howard Neufeld, Arts and Sciences

Coauthor(s): Howard Neufeld, Zane Sink

Southern Appalachian spruce-fir forests are glacial relicts, located as disjunct "islands in the sky" on the highest peaks in this region. Fraser fir (Abies fraseri) dominates at elevations > 1650 m while red spruce (Picea rubens), occurs at lower elevations (1380 – 1650 m). Winter in this forest type brings extended periods of snowfall and freezing temperatures, but is not as severe as in northern boreal regions. Southern spruce-fir forests have longer winter photoperiods, more frequent midwinter thaws, and fewer, less severe subzero temperatures. Despite milder winters in the south, this season still constitutes a substantial portion of the annual cycle for these evergreen trees, yet its importance to the ecophysiology of these trees is poorly understood. Warming may result in more frequent occurrences of mild temperatures, shortened durations of thaws, free soil and stem (capacitance) water for uptake by trees, stimulate below- and above ground respiration, and enhance carbon uptake via photosynthesis. Our study aims to address this knowledge gap by measuring the comparative ecophysiology of both species during winter on Grandfather Mountain, NC. We hypothesize that mild daytime temperatures could enhance winter photosynthesis, enhancing the annual carbon budget. We also predict south-facing needles will have higher levels of pigments than north-facing ones, but will be more prone to photoinhibition on cold days. Measurements are currently underway and results will be reported at the meeting.

Katie Krogmeier, Biology, Undergraduate

DIGITIZING THE TATER HILL PLANT PRESERVE COLLECTIONS

Faculty Mentor: Matt Estep, Arts and Sciences

Coauthor(s): Andrew P. Jenkins, Matt C. Estep

The Southern Appalachian Mountains are home to numerous unique and sensitive plant communities that contain a large amount of our biodiversity. The Tater Hill Plant Preserve was constructed to protect some of these rare community types and the species they contain. This 1,200 acre preserve is part of the Amphibolite Mountains macro site located North of Boone, NC. The goal of this project was to digitize the ASU herbaria inventories from past collections. Beginning in 2017, all collections from the preserve, including faculty and student collections, were organized and photographed. Herbarium records were searched, updated, and all data was finalized and compiled into the S.E.R.N.E.C. database. This effort produced a working list of 792 taxa including 237 genera in 87 families. This project emphasizes the importance of biological inventories and their value to the scientific community. These are the baseline data for additional research including the understanding of species distribution, land management issues, and conservation efforts. Ultimately, we will use this data to produce a digital key for the preserve that can be used in future inventory efforts and for educational purposes.

Jessica McCanless, Biology, Graduate

MODULATION OF THE BREAST CANCER TUMOR MICROENVIRONMENT BY ONCOLYTIC VESICULAR STOMATITIS VIRUS

Faculty Mentor: Maryam Ahmed, Arts and Sciences

Coauthor(s): Darren Seals, Megan Polzin, Rebecca Fuller

High tumor-associated macrophage (TAM) densities in cancerous breast tissue often correlates with poor clinical outcomes. This can be attributed to the M2 macrophage subtype whose wound-healing functions stimulate cancer cell proliferation, tumor angiogenesis, and metastasis, thus making TAMs a suitable target for therapeutics. We are interested in developing oncolytic vesicular stomatitis virus (VSV) as a treatment option for breast cancer. VSV is cytotoxic to breast cancer cells (BCC), including the invasive MDA231 BCC line used in this study. We also have recent data suggesting that VSV converts M2 macrophages to the more immunogenic, tumor-fighting M1 profile. To determine the oncolytic potential of VSV in a simulated breast tumor microenvironment (TME), MDA231 BCCs and model THP1 monocytes were co-cultured and infected with recombinant wild-type (rwt virus) and or matrix (M) protein mutant (rM51r-M virus) strains of VSV. Secretion of the pro-inflammatory cytokines, IL-6 and TNFα was monitored by ELISA. MDA231 monocultures secreted both IL-6 and TNFα, and IL-6 levels increased 2-fold when the two cell types were cultured together. Importantly, we observed that rwt virus inhibited IL-6 and TNFα secretion, while rM51R-M virus enhanced it under co-culture conditions. Our results are consistent with the ability of rwt virus to inhibit host gene expression in infected cells and the ability of rM51R-M virus to promote a pro-inflammatory and potentially immunogenic TME.

Haley McGuirt, Biology, Graduate

THE ROLE OF TRANSLATIONAL REGULATION BY TOR AND LK6 IN PAIN SENSITIVITY

Faculty Mentor: Andrew Bellemer, Arts and Sciences

Chronic pain affects more Americans than any other medical issue. This condition is costing the United States approximately $6 billion in healthcare cost and lost productivity annually. It is important to continue research to better understand chronic pain, as the cellular and molecular mechanisms that regulate sensitivity to painful stimuli are not fully understood. My research seeks to understand how translation is regulated in sensory neurons and identify the role it plays in nociceptor sensitization. To study translational regulation I use a fly model, Drosophila melanogaster. This experimental model allows me to knock down specific genes in neurons that sense noxious or harmful stimuli. The specific genes I am interested, Tor and Lk6, encode for two different kinases that disrupt the assembly of the eukaryotic translation initiation factor 4F complex. It is predicted that disruptions in translation initiation would disrupt sensory neuron function and thus the nociception response in larvae. After successfully knocking down Tor and Lk6, I run behavioral assays to quantify the nociceptive responses of Drosophila larvae to harsh stimuli. I have found that knocking down either kinase with RNA interference reduces sensitivity as predicted. I plan to continue to study these kinases and their role in the development of chronic pain by determining whether they are required for changes in sensitivity that occurs following tissue damage.

Melanie Mcmillan, Biology, Undergraduate

ASSESSING THE VALUE OF AVIAN ECOLOGY FOR SUSTAINABLE WOODLAND MANAGEMENT

Faculty Mentor: Ian Snider, Arts and Sciences

A diverse bird population can provide a wide range of ecosystem services important to the sustainable management of forests. To develop the practice of forest management, it is critical to employ a respect and understanding of the advantages natural processes provide to the field. The aim of this research will be to begin cultivating avian services in the current forest management of the Blackburn Vannoy Farm in Boone, NC by establishing consistent nesting areas. I will begin by gaining an understanding of avian influence on pollination, seed distribution, predation, linking ecosystem processes through migration, ecosystem engineering, and pest management. I will identify 3 plots from the Blackburn Vannoy Farm that would most benefit from these services. Plots will be examined individually to determine their target species based on the functions the species provide. Three bird houses will be constructed for the target species and be strategically placed in the corresponding plot. The goal of this research is to explore how avian services benefit forest resilience, biodiversity, and economy through examination of current forestry management techniques and put these techniques and services into action by providing the resource of shelter.

Claire Menard, Biology, Undergraduate

IDENTIFYING SATELLITE REPEATS IN GRASS GENOMES

Faculty Mentor: Matt Estep, Arts and Sciences

Coauthor(s): Matt Estep, William Nelsen

Satellite repeats are highly abundant, non-coding sequences of DNA, ranging from 150 to 180 base pairs in length that are GC-rich. Additionally, these sequences are found in tandem arrays that span megabases of many plant genomes. It is thought that they may play a vital role in the formation of heterochromatin in centromeres and are also associated with telomeres, but their overall function in eukaryotic genomes is widely unknown. Although these sequences are highly repetitive, they are also fairly well conserved within species. However, they are highly variable between species providing some insight into how they evolve over many generations. Using a bioinformatic pipeline we identified unique satellite repeats in four different grass species closely relayed to maize (Zea mays mays). Once satellite repeats were identified we estimated the percent composition so that we could estimate their impact on genome size in the four grass genomes. Our ultimate goal is to develop molecular probes that can be used in cytological investigations to determine where these repeats are located in grass genomes. Visualization of these repeats within the centromere could provide insight into the dominance effect of genomes after hybridization or why one centromere is chosen over another.

Carmen Montero, Biology, Undergraduate

A SMALL-SCALE SCREEN OF NUTRACEUTICAL COMPOUNDS THAT AFFECT THE INVASIVE PROPERTIES OF CANCER CELLS

Faculty Mentor: Darren Seals, Arts and Sciences

Coauthor(s): Maryam Ahmed, Darren Seals

While cancer is a leading cause of death in the US, it is the spread of tumor cells to distant anatomic sites that accounts for that statistic. We are studying the most basic feature of metastasis, cancer cell invasion, a phenotype attributed to cytoskeletal structures called invadopodia. Recently, 1280 pharmaceutical drugs were recently screened for perturbation of invadopodia development in cancer cells showing the ability to be a viable therapeutic target for cancer. In contrast to pharmaceutical drugs, nutraceuticals are dietary supplements with potential health benefits. Many, like curcumin (turmeric), catechin (green tea), silibinin (milk thistle) and moringa reduce the proteases that drive cell invasion, but their 'modus operandi' in cancer metastasis have largely been unexplored. Here we titrated curcumin, catechin, and moringa onto Src-transformed fibroblasts to see if invadopodia rosette structures were altered. Promising reductions were observed in the number of rosettes per cell for catechin and moringa, though only moringa appeared to be statistically significant. To ensure the effects of moringa were not due to cytotoxicity, we also conducted a metabolic activity assay and observed no differences following moringa treatment. Future studies will seek to verify these results as well as test these reagents on invadopodia-associated proteolytic degradation and marker expression.

Alyssa Phillips, Biology, Undergraduate

CYTOGENETIC TOOLS TO INVESTIGATE THE COMPILOSPECIES

Faculty Mentor: Matt Estep, Arts and Sciences

Coauthor(s): Matt Estep

A compilospecies is defined as a genetically aggressive taxa that "steals" or incorporates the genomes of other taxa via introgressive hybridization. This concept was first defined in Bothriochloa, Capillipedium, and Dichanthium (the BCD clade). Within this clade, Bothriochloa bladhii was identified as the compilospecies. Proper cytological techniques and accurate chromosome counts are needed to begin investigations to understand the mode of hybridization and to track "dominant" genomes. Techniques for preparation of meiotic chromosome spreads in species with more than 60 chromosomes are lacking in the literature. We have developed a modified steam drop method that results in consistent meiotic chromosome spreads. Steam and refixation are used to swell cells and spread chromosomes to avoid overlap and ensure accurate counts. Chromosomes prepared by this method are suitable for use in FISH and other analyses.

Lucas Piedrahita, Biology, Undergraduate

FLOWERING SYNCHRONY, FLORAL DISPLAY, AND REPRODUCTIVE SUCCESS OF AN ALPINE CUSHION PLANT, SILENE ACAULIS

Faculty Mentor: Jennifer Geib, Arts and Sciences

Coauthor(s): Daniel Doak, Megan Peterson, Ellen Waddle

Flowering plant populations have various reproductive systems, potentially influencing the effects of different ecological factors on reproductive success. We tested whether floral display and flowering synchrony with conspecific neighbors affected reproductive success of each sex in a gynodioecious species, Silene acaulis. Furthermore, we explored how varying the spatial scale of synchrony affected its correlation with fruit production. We observed four sites of this alpine cushion plant throughout the 2016 and 2017 flowering periods at Niwot Ridge, Colorado. We counted open flowers every other day and the total number of flowers and fruits produced at the end of each season for 628 individuals. Female plants had significantly higher fruit sets than hermaphrodites. The total number of flowers produced by an individual was positively correlated with fruit set, suggesting that individuals that produce more flowers are more likely to be pollinated. The correlation between synchrony of flowering and fruit production was significantly positive for all scales, suggesting that synchronous flowering attracts pollinators that increase fruit production. Varying the spatial scale by which we calculated synchrony scores had no effect on synchrony's correlation with fruit production, which is potentially due to the short flowering period of the population. Understanding the factors that influence the reproductive success of a gynodioecious population clarifies the processes that may influence populations' responses to climate change.

Jennifer Pilotos, Biology, Graduate

EFFECT OF MORINGA OLEIFERA ON IMMUNE RESPONSE TO MALARIA INFECTION, MALARIA IMMUNITY, AND MALNUTRITION

Faculty Mentor: Michael Opata, Arts and Sciences

Coauthor(s): Nathan C. Mowa

Malaria is a serious disease that affects millions of people worldwide especially in areas where access to modern medicine is not always readily available to the most susceptible. Native people for centuries have used herbal remedies to alleviate common diseases such as malaria; one of these is Moringa oleifera. Despite the prevalent use of Moringa, its effect on malaria infection and immunity is still understudied and poorly understood. Also, the effect of Moringa on malnourished-malaria-infected individuals is not yet known. Therefore, we sought to determine the effect of Moringa on malaria immunity and malnutrition. We infected C57/Bl6 mice with Plasmodium chabaudi; an established mouse strain used to study human malaria. We utilized two methods of delivery: Moringa pellets and Moringa leaf ethanolic extract. We gave mice Moringa pellets or extract daily for 7 days either before or after infection. This was done to establish an optimal timeframe and determine the effect of Moringa on the immune response. We isolated immune cells from the spleens of the mice at day 9 post infection and analyzed them using flow cytometry. We found that Moringa lowered the number of activated B cells and reduced TNF-α production by CD4 T cells. Therefore, our results suggest that while moringa may have other beneficial effects, it may not be beneficial for chronic infections like malaria during the infection period.

Tyler Pyle, Biology, Graduate

THE DYNAMICS OF POPULATION DENSITY, PERSONALITY, AND DISEASE PREVALENCE

Faculty Mentor: Lynn Siefferman, Arts and Sciences

It has long been known that animal density can influence the likelihood of pathogen transmission, but emerging research suggests that animal personality can also have profound effects on pathogen transmission. Individual animals within populations often exhibit consistent behavioral phenotypes- some are social, show high exploratory behaviors, are aggressive and bold while others avoid social interactions, are less exploratory and tend to be meek and cautious. This results in individuals with certain behavioral phenotypes that are more prone to interact socially and transmit pathogens. Thus, the infectious diseases of wild animals can be powerful models for testing epidemiological hypotheses. My research focuses on how the density and personality of eastern bluebirds (Silia sialis) breeding in Watauga county, NC can ameliorate our understanding of the interplay between density and personality on disease dynamics. I will test the hypotheses that breeding density and animal personality interact to influence the risk of infection by Mycoplasma gallisepticum (MG). I predict that MG will be most prevalent in high density and among aggressive personality types while MG prevalence will be similar among aggressive individuals in low densities and meek individuals in high densities. My study can provide insight on how to prevent or control emergent avian diseases and inform epidemiological studies of human populations.

Bradford Rogers, Biology, Undergraduate

DETERMINATION OF APPALACHIAN PLANT COMMUNITIES BY AMBIENT TEMPERATURE AND LIGHT

Faculty Mentor: Matt Estep, Arts and Sciences

Coauthor(s): Byron Burrell, Matt Estep

The Tater Hill Plant Preserve was constructed to protect rare and endangered plants in the Southern Appalachians. In order to fully inventory the 1200-acre preserve, a series of 144 variable radius plots were surveyed for tree species and abundance. The data from these observations were analyzed, and each plot was assigned a habitat type based on canopy cover. Onset HOBO Data Loggers were then deployed in different habitat types, measuring light and temperature. This data will be analyzed to determine if we could observe any differences between habitat types. Analysis will determine whether or not these abiotic factors play a role in delineating forest types, as well as assist in future conservation of the rare plant communities that exist within the Tater Hill Preserve.

Marietta Shattelroe, Biology, Graduate

ASSEMBLING A MOLECULAR TOOLKIT FOR GEUM GENICULATUM MICHX.

Faculty Mentor: Matt Estep, Arts and Sciences

Coauthor(s): Matt C. Estep

Geum geniculatum Michx., bent avens, is an endemic, perennial herb occurring at high elevations on three mountain peaks in the southern Appalachians. The cool, moist climate of the high elevations of the Southern Appalachians are thought to of acted as a refugia for a community of plants including this species during the climatic warming post-Pleistocene. While geographically restricted, these herbs are often locally abundant occurring in up to thousands of individuals per population. Biological research is lacking for G. geniculatum therefore understanding simple life history traits, population demography, pollination biology and genetic diversity are needed to inform conservation strategies for the species. A pilot study was conducted to determine if microsatellite markers constructed for Geum urbanum or Geum reptans would cross amplify in G. geniculatum. Twenty-one markers were screened across individuals from one population in Western North Carolina. Eighteen (86%) of the markers amplified across all individuals screened and were further genotyped to measure allelic diversity and heterozygosity. During the summer of 2018, all known populations will be demographically surveyed and leaf tissue samples will be collected for DNA extraction. The 18 microsatellite markers will be used to genotype these populations to determine genetic diversity and population connectivity.

Savanna Sheridan, Biology, Undergraduate

FEEDING BEHAVIOR OF LARVAL ZEBRAFISH

Faculty Mentor: Mary Kinkel, Arts and Sciences

Coauthor(s): Mary Kinkel

Our lab studies gastrointestinal (GI) tract diseases using the zebrafish model. We are developing a gut transit assay that will allow us to track food passage along the GI tract of live larval fish. Our general approach is to feed the fish a meal of live shrimp and determine the passage rate. However, catching shrimp appears to be a learned behavior and very young fish may be unsuccessful. Our objective is to determine at what age the fish can reliably catch shrimp. This will give us a minimal age for performing the transit assay. First, we analyzed two shrimp strains to confirm literature reports that one strain is smaller than another. Surprisingly, we found no difference in size (length and width). We concluded that the specific shrimp strain will not bias the ability of the fish to catch it, based on size. Next, we daily tested the ability of fish to catch shrimp. Capture success was determined by imaging fish gut contents shortly after a meal. At 7 days post fertilization (dpf), only 20% of larval fish had captured a shrimp. At 8 dpf, 40% had captured a shrimp. By 14 dpf, 100% of larvae had captured a shrimp. Thus, we confirmed that capturing shrimp is a learned behavior. Unexpectedly, we found that at 10 dpf and older, some fish ate more than one shrimp per meal. A goal for the gut transit assay is to control the meal size so that each fish eats only one shrimp. Therefore, we concluded that the transit assay should be performed using larvae at 8 or 9 dpf.

Dalton Sizemore, Biology, Undergraduate

EFFECT OF POLARIZATION STATUS ON THE DEGRADATIVE ABILITY OF THP-1 DERIVED MACROPHAGES

Faculty Mentor: Darren Seals, Arts and Sciences

Coauthor(s): Megan Polzon, Maryam Ahmed, Darren Seals

Podosomes form on the ventral surface of professionally invasive cells and promote adhesion to and degradation of the extracellular matrix (ECM). Such is the case of macrophages, which play a surveillance role in tissues against infection or injury. Macrophages have distinctive polarization profiles. M1 macrophages promote inflammation, stimulate host immunity, and produce reactive nitrogen and oxygen species in response to infection. M2 macrophages decrease inflammation, curtail host immunity, and focus on wound healing in response to injury. We have wondered whether the nature of podosomes and the invasive behavior they confer is different between the macrophage polarization extremes. To that end, model THP-1 monocytic leukemia cells were differentiated into macrophages following exposure to lipopolysaccharide and interferon gamma (M1) or interleukin-4 and interleukin-13 (M2). Polarization was verified by the expression of polarization markers like phosphorylated STAT1 (M1) and CD204 (M2). Podosomes were identified by punctate organization of filamentous actin while gelatin matrix degrading podosome activity was based on an in situ zymography assay. Our data show that all macrophage subtypes can form podosomes. Nevertheless, there is a statistically significant reduction in the number of podosomes in M1 macrophages. Studies continue to address if these reductions in podosome number reflect any difference in gelatin degradation activity or the ability to invade through ECM.

Jamison Slate, Biology, Graduate

THERAPEUTIC EFFECTS OF SUBFRACTIONS ISOLATED FROM ETHANOLIC MORINGA OLEIFERA LEAF EXTRACTS IN CANCER AND INFLAMMATORY DISEASES

Faculty Mentor: Maryam Ahmed, Arts and Sciences

The nutrient-dense and medicinal plant, Moringa oleifera (MO), has a variety of reported therapeutic applications, which makes it a popular nutraceutical on the natural product market. However, scientists have only recently started to verify the therapeutic potential of MO products. Previous studies in our labs have shown potent anti-inflammatory and anticancer effects associated with ethanolic MO whole-leaf extracts. To further investigate potential applications of these MO extracts, our current project uses high performance liquid chromatography (HPLC) to separate bioactive compounds from the whole extract into distinct subfractions. We hypothesized that these HPLC-isolated MO subfractions could exhibit therapeutic effects in a cancer microenvironment by decreasing cancer cell viability and attenuating inflammatory cytokine production. Our results indicated that several of the subfractions significantly decreased the viability of HeLa and SiHa cervical cancer cells in a dose and time dependent manner. Additionally, these subfractions decreased macrophage secretion of the pro-inflammatory cytokines, IL-6 and TNF-alpha, in a LPS-induced model of inflammation. Overall, these data indicate that chemical compounds in MO may be explored as an alternative treatment option for some cancers and inflammatory disorders. Further studies in our labs will seek to identify the bioactive compounds in our subfractions using time-of-flight mass spectrometry and other analytical techniques.

Maggie Smith, Biology, Undergraduate

SPLENOCYTES FROM YOUNG MICE PROTECT IMMUNOCOMPROMISED MICE AGAINST DEATH FROM MALARIA INFECTION, BUT THEY DO NOT PROLIFERATE WELL.

Faculty Mentor: Michael Opata, Arts and Sciences

Coauthor(s): Corey Johnson, Logan Campbell

The immune system plays an essential role in the elimination of malaria parasites. CD4+ T cells are imperative in the immune response to the infection, but immune response in malaria especially in young children is poorly understood, due to a lack of a young rodent animal model to study the pathogenesis of the disease. We recently developed a young mouse malaria model to help understand the immune response and development of protective CD4 T cells. Using day 15 pups, we are able to replicate malaria in children. Therefore, we determined the ability of pup cells to protect immunocompromised RAGKO mice from malaria infection. We infected day 15 old pups with 1x10^5 iRBCs of Plasmodium chabudi, and transferred splenocytes to RAGKO mice on day 8 post-infection. Mice that received pup cells looked healthier and active throughout the experiment, compared to their counterparts who received adult spleen cells. During the peak of infection, mice that received adult cells lost more weight than the pup cell recipients. We observed that IFN-gamma and TNF-alpha were significantly higher in adult cell recipients on day 60 post-infection. This data suggest that pup cells protect immunocompromised mice from death, but do not develop well into memory. Future studies will determine factors influencing protection.

Megan Tennant, Biology, Graduate

CHARACTERIZATION OF THE MEIS2 LOCUS

Faculty Mentor: Ted Zerucha, Arts and Sciences

Coauthor(s): Tyler Ferrara, Cody Barrett, Kyle Nelson, Cort Bouldin and Ted Zerucha

The Meis genes are a member of the three amino acid loop extension (TALE) superclass of the homeobox super-family of genes. Homologs of Meis have been identified in all animals examined and are expressed in similar patterns during embryogenesis. The Meis genes code for the production of proteins that act as transcription factors, directly regulating the expression of target genes. These proteins also act as cofactors, where they interact with other transcription factors and DNA to facilitate transcriptional regulation. Although the molecular function and expression pattern of the Meis genes is fairly well-characterized, little is known about how their expression is regulated. We have identified four highly conserved noncoding elements associated with the vertebrate Meis2 gene and named them M2de1-4 (Meis2 downstream element). To date, M2de2-4 have only been found in land vertebrates, while m2de1 is also found in teleosts, where it is downstream of meis2a. These elements are found within the introns of an adjacent gene, zgc:154061 in zebrafish, whose orthologs are always directly downstream of Meis2 in vertebrates. The expression patterns of meis2a and zgc:154061 and the expression directed by m2de1 in zebrafish overlap. We propose that the genomic organization of these two genes has been conserved due to the sharing of cis-regulatory elements. Currently, we are working on knocking out m2de1 via CRISPR/Cas9 to determine the effects on the expression of meis2a and zgc:154061.

Douglas Watson, Biology, Undergraduate

DISCOVERING MFP1'S ROLE IN PATHOGENIC STRESS RESPONSES

Faculty Mentor: Annakatrin Rose, Arts and Sciences

We are using the model organism Arabidopsis thaliana to study the function of Matrix Attachment Region-binding Filament-like Protein 1 (MFP1). MFP1 is coiled-coil DNA-binding protein that is associated with nucleoids and with the thylakoid membranes in mature chloroplasts. Its expression is correlated with the accumulation of thylakoid membranes, though in vivo it is associated with nucleoids suggesting a function for MFP1 at the interface between chloroplast nucleoids and the developing thylakoid membrane system. The exact function of MFP1 in the plant is still unknown. We believe that MFP1 may be involved in stress response, in particular pathogen stress response, because preliminary data suggests that MFP1 seed set in mutants is much lower than the wildtype after Agrobacterium infection, but can be complemented by reintroducing MFP1 cDNA into mutant plants. In order to test this hypothesis, the purpose of this project is to compare wildtype, knock-out mutant (no MFP1), and complemented mutant (with MFP1 cDNA reintroduced) under pathogen stress (infection with Agrobacterium). To achieve this, we have grown wildtype and mutant plants and extracted DNA from the leaves to confirm the genotypes by PCR. Then we infected the plants with Agrobacterium through floral dipping and compared the wildtype and mutant phenotype after infection to tell if there is a phenotypic difference between the mutant and wildtype after dipping.

Adam Willits, Biology, Graduate

THE ROLES OF CELLULAR SIGNALING PATHWAYS IN REGULATING NOCICEPTIVE BEHAVIOR IN DROSOPHILA.

Faculty Mentor: Andrew Bellemer, Arts and Sciences

Coauthor(s): Joshua Herman, Andrew Bellemer

Chronic pain is a major public health concern that affects about 100 million Americans, costs $500-600 billion in healthcare costs, and is a major cause of missed work. For these reasons, it is important to research the molecular biology of pain to develop better ways to treat different pain conditions. To better understand pain, my research uses Drosophila melanogaster, the common fruit fly, to investigate sensory neuron function. My major goal is to understand the cellular signaling mechanisms that control sensory neuron sensitivity. Because it has a fully sequenced genome that is easily manipulated, I can remove the function of certain genes to understand their role in pain reception. In one project, I studied flies lacking the function of the Gαq and NorpA proteins involved in neurotransmitter signaling and found that both proteins are required for behavioral responses to harsh thermal and mechanical stimuli. Removal of their function does not result in morphological differences in the somatosensory neurons that detect harsh stimuli, which suggests that they are involved in signaling in these neurons instead of development. In a second study, I have targeted a gene involved in the Wnt signaling pathway called off-track 2 (otk2), which encodes a transmembrane receptor in Drosophila. I hypothesize that this gene acts to support the sensitivity of nociceptors and am currently conducting experiments to determine its role in neuron development.

Erin Young, Biology, Graduate

IDENTIFICATION OF THE BINDING INTERFACE BETWEEN NSPS AND MBAA IN VIBRIO CHOLERAE

Faculty Mentor: Ece Karatan, Arts and Sciences

Coauthor(s): Ece Karatan

Cholera is a gastrointestinal disease that affects millions of people and causes approximately 100,000 deaths each year. Vibrio cholerae, a Gram-negative bacterium, is the causative agent for this disease. Elucidating the molecular regulation that controls the transition between its two states of existence, a motile state associated with increased virulence and a sessile state associated with biofilm formation, is important for a better understanding of V. cholerae's life cycle and pathogenesis. Based on previous work, it is hypothesized that the periplasmic protein NspS interacts with the periplasmic portion of the protein MbaA. This interaction affects MbaA's enzymatic activity, which alters local levels of cyclic diguanylate leading to an overexpression or inhibition of biofilm formation. This study aims to identify the binding interface between NspS and MbaA by a random mutagenesis approach. Error prone PCR was performed to introduce random mutations into the nspS gene and the products were used to generate a mutant library. This library was transformed into a mutant nspS strain of V. cholerae and mutant clones were assessed for biofilm formation using crystal violet staining. Mutant clones deficient in biofilm formation were sequenced to identify residues involved in the interaction between NspS and MbaA. This information will give insights into the mechanisms that regulate Vibrio cholerae biofilm formation and the transition between its planktonic and sessile state.

CHEMISTRY

Angelina Azieva, Chemistry, Undergraduate

SYNTHESIS OF BIODIESEL FUEL FROM WASTE COOKING OIL USING NANO- REACTORS

Faculty Mentor: Nicholas Shaw, Arts and Sciences

Biodiesel production from pure plant-based oils is a well-established process, however the use of pure plant-based oils poses economic considerations and significant risks to food security. The major cost factor in the production of biodiesel is the cost of the raw material – catalyst and raw material costs account 70-88% of the overall costs. Between 2004-2007 approximately 34% of edible oil was estimated for worldwide biodiesel production. In an effort to alleviate feed-stock challenges, the use of used waste cooking oils (which are up to three times less expensive and are capable of producing around 50% of current biodiesel demand) as feedstock for biodiesel production has been explored. Waste cooking oil differs chemically from their pure-counterparts as pure oils slowly and partially decompose into free fatty acids (FFAs) upon extended use which complicates biodiesel production. The presence of FFAs dramatically increase the production of soap when traditional alkali catalysts are used, decreasing the overall yield of biodiesel. The acid catalyzed transesterification of used cooking oil 'tolerates' the presence of FFAs, as both oil and FFAs are converted into biodiesel, however, the acid catalyzed conversion of FFAs is time consuming and produces water as a byproduct which can water as a byproduct which can dramatically decrease the overall yield of biodiesel. The authors present a facile and efficient procedure for the synthesis of biodiesel fuel from waste cooking oil using nano-reactors.

Cassidy Chapman, Biology, Pre-professional, Undergraduate

AN EXPLORATION OF N-TERMINUS PEPTIDE GROWTH IN NANO-REACTORS

Faculty Mentor: Nicholas Shaw, Arts and Sciences

Coauthor(s): Alli Bumgarner

The synthesis of proteins has challenged chemists for over a century. Chemical synthesis of proteins offers advantages over molecular biology and genetic engineering approaches – most importantly, the ability to synthesize a single, pure protein. Since the first simple peptides (proteins) were synthesized, and development of solid-phase peptide synthesis, there have been no advancements in peptide synthesis. To date, in order to chemically synthesize a peptide, a N-terminus protected amino acid is activated to produce a N-terminus protected activated ester. This activated ester is combined with a C- terminus protected amino acid to produce a di-peptide. The N-terminus end of the di-peptide is deprotected and coupled to the incoming N-terminus protected amino acid activated ester. For those keeping track at home, a total of two synthetic steps are required for each amino acid coupling. Each synthetic steps is slave to the principles of chemical reactivity – long reaction times and incomplete reactivity. The synthesis of a tri-peptide where each synthetic step achieves the desired product in a 90% yield results in an overall tri- peptide yield of 53% - the law of diminishing returns. The use of nano-reactors in the synthesis of peptides is advantageous as it affords coupling in 100% yield which circumventing the need for amino acid activation. Therefore, a traditional tri-peptide synthesis is reduced to two-steps with a 100% overall yield. The authors will report the development of a procedure for N-terminus peptide synthesis.

Morgen Dugan, Biology, Undergraduate

AN EXPLORATION OF C-TERMINUS PEPTIDE GROWTH IN NANO-REACTORS

Faculty Mentor: Nicholas Shaw, Arts and Sciences

The chemical synthesis of peptides is traditionally conducted through N-terminus coupling of amino acids. A N-terminus protected amino acid activated ester is combined with a C-terminus protected amino acid. The N-terminus end of the resulting di-peptide is subsequently deprotected and combined with an incoming N-terminus protected amino acid activated ester. This process is repeated for each incoming N-terminus protected amino acid activated ester as the peptide continues to increase in length. While this method is subject to long reaction times and low yields. The synthesis of a five-amino acid peptide, wherein a 75% yield is achieved after each coupling step, produces the desired five-amino acid peptide in a mere 23.7% overall yield. Nano-reactors are advantageous for C-terminus peptide synthesis as they force chemical reactivity by restricting reactants to nano-sized reaction vessels. Furthermore, the nano-reactor is hydrophobic, so an amine and carboxylic acid in an nano-reactor react in a Lewis acid/Lewis base manner producing the desired amide and water. The produced water is expelled from the hydrophobic nano-reactor driving the reaction forward. C-terminus coupling is advantageous as C-terminus deprotection is less subject to incompleteness and the use of nano-reactors circumvent the use of N-terminus protected amino acid activated esters. The author will report the use of nano-reactors for the C-terminus sequential coupling of amino acids.

Ethan Finlay, Chemistry, Undergraduate

EFFICIENT AND COMPLETE SYNTHESIS OF BIODIESEL FUEL USING NANO-REACTORS

Faculty Mentor: Nicholas Shaw, Arts and Sciences

Coauthor(s): Nicholas Shaw

Biodiesel is an alternative fuel that contains approximately 90% of the energy content of fossil derived diesel and is as a promising long-term replacement to petroleum-based diesel fuels. In many ways, biodiesel is an advantageous replacement to fossil derived diesel as it is biodegradable, it possesses an inherent lubricity (which improves engine longevity) and higher flashpoint (which makes it safe to store, handle, and transport), it is compatible with the existing fuel distribution infrastructure, and reduces combustion emissions to near zero. The synthesis of biodiesel (chemically known as fatty acid esters) is technically and logistically simple. Combine a lipid (typically vegetable oil), alcohol (typically methanol), catalyst, and heat at a moderate temperature (approximately 60 °C). Following purification, biodiesel, suitable for combustion in any compression engine, is obtained. The method for this 'transesterification' of lipids is so simple it is commonly taught in sophomore level collegiate organic chemistry teaching laboratories and is the method of choice used at large-scale biodiesel production facilities and by at home do-it-yourselfers alike. The authors present a new and efficient process for the production of biodiesel fuel using nano-reactors.

Lydia Harris, Chemistry, Undergraduate

CO-EXPRESSION USING THE DUAL PLASMID APPROACH OF THE TWO SUBUNIT PROTEIN DIMETHYLSULFIDE MONOOXYGENASE FROM HYPHOMICROBIUM SULFONIVORANS

Faculty Mentor: Megen Culpepper, Arts and Sciences

Coauthor(s): Megen Culpepper

Dimethylsulfide (DMS) is a volatile organic sulfur compound (VOSC) that makes up about 70% of the atmospheric sulfur flux. Its ability to increase cloud formation, thereby lowering solar radiation, makes it an important gas to investigate for climate cooling. The degradation pathway of DMS is widely uncharacterized. One enzyme on this pathway, DMS monooxygenase has been purified and characterized from the soil bacteria Hyphomicrobium sulfonivorans as a flavin mononucleotide dependent two-component monooxygenase. One subunit, DmoA, is a putative monooxygenase, and the other, DmoB, is a putative flavin reductase. Native protein isolation and purification indicates that the DmoA and DmoB subunits coexpress. In order to coexpress, the dmoA and dmoB176 genes were cloned in separate vectors with unique origins of replication and antibiotic resistances. The dmoA and dmoB176 genes were co-transformed using the two plasmid approach in BL21DE3 E. coli, expressed, and purified via affinity chromatography. Initial data confirms expression of the DmoA monooxygenase protein at Mr of 53 kDa, and a protein overexpressed at Mr of 17 kDa as analyzed by SDS-PAGE. DmoB176 has a Mr of 19 kDa based on its amino acid sequence. Future studies include blue Native-PAGE and gel filtration to determine if an interaction is occurring between the subunits and enzyme activity measurements by headspace-gas chromatography.

Hayden Lane, Chemistry, Undergraduate

SURFACES ARE EVERYWHERE: A COMPUTATIONAL INVESTIGATION INTO SILICA ADSORPTION INTERFACES

Faculty Mentor: Jefferson Bates, Arts and Sciences

Coauthor(s): Lauren Woods, Jefferson E. Bates

Buried interfaces can be difficult to investigate experimentally. However, these interfaces are important to many processes, such as cell behavior, chromatography measurements, and environmental remediation procedures. There is a need to be able to explore these regions efficiently and accurately without specialized equipment, as interfacial chemistry is not easy to predict based on bulk properties. This project aims to explore different approaches to modeling the silica/adsorbate interface, an important factor in developing chromatography columns, producing thin films, and understanding environmental chemistry of soil pollution. The goal of this research is to compare how the dimensions and parameters (e.g. size, number and type of terminal groups, charge, etc.) of the surface influences molecular adsorption of small compounds. Varying the surface morphology should affect the solid/adsorbate interfacial geometries, changing how molecules adsorb. The interaction between adsorbate and surface will be investigated by computing the binding energies for various adsorbates. Since it is difficult to model amorphous silica computationally, a silica polymorph, β-cristobalite, was protonated to reflect the distribution of silanol adsorption sites on the surface of amorphous silica.

Samantha Malone, Biology, Undergraduate

DIRECT AMIDE BOND COUPLING OF AMINO ACIDS IN NANO-REACTORS

Faculty Mentor: Nicholas Shaw, Arts and Sciences

Amide bond coupling of a carboxylic acid and an amine typically proceeds via activation of the carboxylic acid (substitution of the hydroxyl group with a better leaving group, for example an activated ester) and subsequent reaction with an amine under basic conditions. Activating agents include carbodiimides, such as EDC, often used in conjunction with HOBt, and phosphonium agents, including PyBOP. Bases commonly used in amidation reactions include pyridine, triethylamine, and DMAP. The inclusion of at least two of the preceding compounds suggests that amidation reactions typically require multiple purification steps, often involving column chromatography, which is both time consuming and costly, to separate the desired product from these reagents, inevitably reducing yield. The Shaw Research Group pioneer efforts in the use of nano-reactors in organic synthesis. Nano-reactors provide a unique opportunity to conduct synthetic reactions previously unachievable using traditional methods – the direct coupling of carboxylic acids and amines to produce amides. The authors will report the use of nano-reactors in the direct coupling of amino acids to produce di-peptides.

Madeline Miles, Chemistry, Undergraduate

DON'T WORRY BEE HAPPY: CLOSING THE WASTE WATER LOOP

Faculty Mentor: Nicholas Shaw, Arts and Sciences

Hospitality Mints is the largest supplier of custom mints in America. Their products are sold to leading national restaurant chains as well as the promotional products industry, and grocery, drug, mass, and specialty retailers both nationally and internationally. They manufacturer over one billion mints every year. Currently, all of the process, production, and cooling waste water from Hospitality Mints is directed to the same effluent stream. As a result, the water contains the dissolved and suspended candy ingredients as well as machine oils and cleaning and sanitation compounds. The average daily liquid effluent from Hospitality Mints is approximately 20,000 gal/day and is directed to five 2,000 gallon grease interceptors. The grease interceptors act to separate the fats from the water as well as settling out solids that were suspended in solution. The water can then flow to the sewer main. However, the biological oxygen demand of the wastewater remains too high to dispose of the water without treatment, which can be costly. Not only are there the environmental considerations of using large quantities of water that, because of their organic contaminants, cannot be cycled directly back into the environment, there are the economic ones as well that are the driving forces for reducing this waste stream in general. The authors will report use of Hospitality Mints' effluent stream for use as a feedstock for both fuel ethanol production and for commercial bee production, which would convert the sugar water into honey.

Hayley Perusek, Chemistry, Undergraduate

SYNTHESIS OF ACETAMINOPHEN USING NANO-REACTORS

Faculty Mentor: Nicholas Shaw, Arts and Sciences

Coauthor(s): Taylor Ramsey, Nicholas Shaw

Chemical reactivity is achieved when a synthetic chemist makes due effort to ensure reactants collide with sufficient velocity and in the correct 3-D orientation. Synthetic chemists optimize conditions (temperature, reactant concentration, volume, and pressure) to achieve chemical reactivity. However, even if conditions are optimal, most reactions fail to reach 100% pure product yield. Isolating the desired product requires tedious purification. Standard reactions can take a week from start to finish only to produce a 60% yield – generally accepted as 'good yield'. Multi-step synthesis, starting with one reactant and performing multiple synthetic steps to obtain the desired product, is commonly applied. However, a five-step synthesis, wherein a 75% yield is achieved after each step, produces the product in a mere 23.7% overall yield, all while taking weeks to complete! The pharmaceutical industry is heavily reliant on synthetic chemistry. Advancements in instrumentation and techniques have expanded the applications of this field, but chemical principles remain constant since their inception. Few advancements have been made that maximize time efficiency and product yields. The Shaw Research Group is pioneering efforts to restrict reactants to nano-reactors. The restriction to nano-reactors ensures molecular reactivity, reducing the time-consuming and low-yielding results of conducting synthetic organic chemistry traditionally. The authors present the application of nano-reactors to the synthesis of acetaminophen.

Samantha Steyl, Chemistry, Undergraduate

OVEREXPRESSION OF MANGANESE SUPEROXIDE DISMUTASE IN MOUSE LIVER LEADS TO DEFECTS IN OXIDATIVE PHOSPHORYLATION

Faculty Mentor: Brooke Christian, Arts and Sciences

Non-alcoholic fatty liver disease is a chronic disease that could be treated with antioxidant therapy, although antioxidants have led to negative side effects. Manganese superoxide dismutase, SOD2, is an antioxidant enzyme that turns the superoxide radical to hydrogen peroxide, H2O2. It contributes to defense against oxidative damage to the mitochondria, such as reactive oxygen species. Reactive oxygen species are thought to be damaging to the cell, although are necessary to certain cell signaling pathways. An over expression of the SOD2 antioxidant could eliminate too much ROS, which would cause a decrease in oxidative phosphorylation because of the increase in hydrogen peroxide. The increase in hydrogen peroxide could lead to the negative side effects of the antioxidant SOD2. The protein complexes within the mitochondria drive oxidative phosphorylation, and a decrease in these complexes in the SOD2 mice would contribute to a decrease in oxidative phosphorylation because of the overexpression of SOD2. Preliminary studies showed a reduction of complex II in the SOD2 samples run under blue native PAGE, and a reduction of complex II, III and IV in the SOD2 samples run under SDS PAGE. Current studies have shown a reduction of complex V in the SOD2 samples run under Blue Native PAGE by western blot. Western blot results for reduction of complexed I, II, and III are under investigation, and positive results from these experiments would confirm the reduction of mitochondrial complexes due to overexpression of SOD2 in mouse liver.

Franchesca Uribe Rheinbolt, Chemistry, Undergraduate

CHROMATOGRAPHIC SEPARATION OF PHOTOCHEMICALS IN MORINGA OLEIFERA LEAVES

Faculty Mentor: Jennifer Cecile, Arts and Sciences

Coauthor(s): Jennifer Cecile

Moringa oleifera is a tropical plant that has been traditionally used due to its rich composition of protein, lipids, minerals, vitamins, and phytochemicals. All the parts of the plant are edible, and previous research suggests the presence of bioactive compounds in Moringa oleifera leaves that could lead to positive health benefits. A literature review demonstrated approximately 300 phytochemical compounds previously identified in Moringa oleifera leaves. A comprehensive analysis of the bioactive compounds, or phytochemicals, either acting alone or in combination with other compounds is needed. This study focuses on the phytochemicals that interact with light at the UV and visible regions or photochemicals. Ethanolic and aqueous extracts of Moringa oleifera leaves have been studied with absorbance and fluorescence spectroscopy which suggests spectroscopic detection is viable following chromatographic separations. Paper chromatography initially suggests the presence of flavonoids as photochemicals in the leaves of Moringa oleifera. Future work involves optimization of the extraction method and capillary electrophoresis with absorbance and fluorescence detection to further analyze the photochemical composition of the Moringa oleifera leaves. These results will be used to assist with identification of bioactive compounds that promote positive health effects as well as possible standards for leaf extraction.

Dallas Welborn, Chemistry, Undergraduate

SYNTHESIS OF ETHYL AND PROPYL FATTY ACID ESTERS IN NANO-REACTORS

Faculty Mentor: Nicholas Shaw, Arts and Sciences

Continued dependence on fossil fuels for energy production pose numerous and significant challenges. Fossil fuels are non-renewable, limited in supply, and cause damage to the environment. The search for renewable, readily available, environmentally acceptable, technically feasible, and economically competitive alternative fuels remains an ethical obligation. Biodiesel is an alternative fuel that contains approximately 90% of the energy of fossil derived diesel and is as a promising long-term replacement to petroleum-based diesel fuels. In many ways, biodiesel is an advantageous replacement to fossil derived diesel as it is biodegradable, it possesses an inherent lubricity (which improves engine longevity) and higher flashpoint, it is compatible with the existing fuel distribution infrastructure, and reduces combustion emissions to near zero. The most commonly produced biodiesel is produced using methanol. Methanol is relatively cheap when compared to other alcohols. And while these methyl ester fatty acids are suitable for compression engine combustion, fatty acid esters derived from different alcohols have physical characteristics that make their combustion more appealing. Fatty acid ethyl esters provide the opportunity to synthesize biodiesel that is a truly 'green' as ethanol can be sourced naturally. Furthermore, fatty acid esters synthesized from propanols and butanols have a higher lubricity which decreases engine wear and increases engine longevity. The authors will present new methodologies for the synthesis.

Amber Woodington, Chemistry, Undergraduate

DEVELOPMENT OF METHODOLOGY FOR THE SAPONIFICATION OF ESTERS IN NANO-REACTORS.

Faculty Mentor: Nicholas Shaw, Arts and Sciences

Organic chemistry is the practice of diminishing returns. Synthetic organic reactions require reactants to collide with sufficient energy and in the correct orientation. Only then will the reactants possess the necessary requirements to overcome the reaction's activation energy and produce the desired product. Surprisingly, organic chemists will use the term 'optimize' to describe the process wherein the reaction time, temperature, pressure, concentration are varied to achieve 'optimal' conditions for reactivity. Typically, these optimized conditions are far from optimized and reactions require significant time produce the desired product in non-quantitative yields – less than 100 percent. It's hard to believe a reaction is optimized when it takes 48 hours to complete and only yields 65% of the desired product. Nano-reactors provide the opportunity to drastically reduce reaction times to mere minutes while increasing reaction yields to 100%. Nano-reactors facilitate organic reactions when the nano-reactors absorb the reactants and solvent into central cavities. To accommodate the molecules, the nano-reactor swells 3-5 times its dry volume. The solvent is then removed, which collapses the nano-reactor, forcing the reactants to collide in a nano-sized cavity. However, the use of nano-reactors is limited to organic reactants. Saponification reactions require the use non-organic alkali bases. The authors will report the development of nano-reactors for reactions (saponification) that require the use of non-organic reactants.

COMMUNICATION

Jessica Barker, Communication, Undergraduate

PLAYING THE RACE AND GENDER CARD ON SOCIAL MEDIA: HOW MINORITY CONGRESSWOMEN USE TWITTER TO COMMUNICATE WITH THE PUBLIC

Faculty Mentor: Newly Paul, Fine and Applied Arts

The purpose of this project is to determine how minority congresswomen use Twitter to communicate with their followers. Social media researchers have not explored this question yet, and this project draws from gender and racial stereotype theories to compare minority and white congresswomen's use of Twitter. Existing research on white women politicians' communication patterns shows that they follow gender stereotypic communication strategies such as focusing on personal narratives rather than abstract policy discussions. But sometimes, they stray from gender stereotypic behavior by using negative and attack-themed tweets. Minority women's campaign strategies are likely to account for racial as well as gender stereotypes. Voters perceive minority women as unfit for leadership positions, more liberal than they actually are, and more likely to align themselves with racial issues such as immigration and welfare. These perceptions could affect their campaign communication on social media, but we are yet to know how. This project aims to answer this question by conducting a quantitative content analysis of 600 tweets gathered over a 10-day period in March 2018, from minority and white congresswomen's Twitter accounts, and analyzing differences in their communication patterns. Preliminary results show that minority women are more likely to use Twitter, and are more likely to discuss racial and gender issues than white women. Minority women are also more likely to criticize their opponents on Twitter.

Audrey Everett, Communication, Undergraduate

COLOR GRADING IN FILM: HOW COMPLEMENTARY COLORS AFFECT AN AUDIENCE'S PERCEPTION OF MOOD

Faculty Mentor: Valerie Wieskamp, Fine and Applied Arts

Throughout my experience with video editing, I've learned about the concept of color grading, in which a colorist is hired to create a Lookup Table, or LUT, to change the coloring of a film. Through my own inquisition, I've noticed that the Teal/Orange LUT is the most popular one used in modern film.

In my thesis, I hope to expand on the reasoning why these LUT's are used in film, and the emotional effects they have on the audience. I'm focusing on complementary colors, comparing Teal/Orange with the two other sets of colors, Red/Green and Purple/Yellow. I hope to find the reasoning behind why the Teal/Orange LUT is so commonly used in film, especially in the action genre. My hypothesis is that a created sense of excitement and thrill is produced through the warmer tones of Teal/Orange. Going along with that, I predict the Red/Green LUT will produce a cooler more distant response, where the subject feels less inclined to watch the film. Finally the Purple/Yellow LUT will produce a more antique feel to the clip, emphasizing the quirky appeal of the LUT.

Using this information, I'd like to then answer the question as to why these secondary LUT's aren't used in film as frequently and what makes the Teal/Orange LUT so special. I'll also cross-examine my results with the ideas of both Color Theory and the Thematic Apperception Test. Then in my future endeavors into the professional world of video editing, I'd like to be able to use my findings to become a better colorist and build my talents as a video editor.

Jaelyn Felder, Communication, Undergraduate

THE EXPLORATION OF THE BLACK WOMAN'S TRUTH: LINKING SLAVERY, STEREOTYPES, AND MEDIA

Faculty Mentor: Newly Paul, Fine and Applied Arts

Coauthor(s): Newly Paul, Kimberly Green

In American culture, Black women have often been categorized in stereotypical ways as the hypersexualized jezebel, the subservient mammy, or the angry Black woman. These disparities can primarily be seen in our media which has become a major part of culture and deeply influences public opinion. The study defines media as television sitcoms and dramas, and the sample for analysis is made up of seven shows dating back from the 1950's to the present day. The study uses qualitative analysis of these shows to arrive at the main themes that were used to depict Black women characters. Preliminary results show that the stereotypes that were used throughout history to represent Black women are still subtly represented in our media. In addition, the study also found that current shows lack an opportunity to connect with younger Black women. The study recommends creating a TV show that defies stereotypes and focuses on young Black women who have to figure out how to break through them.

Mariah Reneau, Communication, Undergraduate

LOOKING AT THE REALITY OF PARTY CULTURE: AN ETHNOGRAPHIC LOOK AT THE GOOD, THE BAD AND THE UGLY

Faculty Mentor: Chris Patti, Fine and Applied Arts

Party culture on college campuses is a topic that is met with both disdain and a sense of inevitability. Although there is the constant condemnation of partying practices, there also seems to be a glorification of partying in pop culture. Partying is something that many people look back at fondly and in fact, feel that attending parties was essential for their college education. However, even with so many people partaking in these rituals, there is only a handful of studies done on the overall effects of college partying. Therefore, my goal in this ethnographic study was to not only experience this culture, but also analyze aspects of it to understand the practice better as a whole. Through the attending of events, interviews and surveys, I have researched not only who goes to and what happens at parties, but also why students attend and are almost encouraged to attend these festivities.

COMPUTER SCIENCE

Karen Gibson, Biology, Undergraduate

VALIDATION OF MICRORNA TARGET INTERACTIONS FOR ACCURATE PREDICTIONS

Faculty Mentor: Mohammad Mohebbi, Arts and Sciences

The interaction between miRNA and mRNA target sites can cause RNA silencing and post-transcriptional regulation. Experiments to determine these miRNA-mRNA target interactions are very time consuming which highlights the importance of an accurate prediction method. Dr. Mohammad Mohebbi has developed a graphing algorithm that uses machine learning to predict these interactions. This research is focused on finding experimentally validated interactions for the algorithm to learn then accurately predict unknown miRNA-mRNA interactions. There are some databases of these interactions. However, the data is often not experimentally determined. This research focuses on searching current databases: mirTarBase, miRBase, and more to compile experimentally validated miRNA-mRNA target interactions. An algorithm that accurately predicts these interactions would have vast implications in cancers through gene regulation. Many studies have found a correlation between the abundance and sequence of miRNA found in cancerous cells and the rate of cell proliferation. More accurately predicting miRNA-mRNA target interactions could have vast improvements on cancer therapy.

Nathan Potvin, Computer Science, Undergraduate

MINING CORRELATIONS OF TOPOGRAPHIC MAP FEATURES WITH RATINGS OF LOCAL BUSINESSES

Faculty Mentor: Mohammad Mohebbi, Arts and Sciences

Coauthor(s): Mohammad Mohebbi

Local businesses are constantly evaluated and reviewed by their customers and have different ratings even in cases that they belong to the same store chain. For example, review scores of Subways store in Walmart may not be the same as those near a college campus or in a quiet neighborhood. Since many factors, including topographic features of the business location, affect the rating of a business such a study that can reveal the effect of topographic location on customer ratings is significant. In this project, we are working on extracting topographical features from online maps. With advances in machine learning, data mining and deep learning algorithms, we will be able to analyze a large amount of data and discover possible correlations that could not be discovered without the help of Data Science tools. By utilizing machine learning and data mining methods, our goal is to discover features on Google Maps that have strong correlations with a business rating. As part of this project, an application is developed that could extract the address, rating, business type and nearby stores, buildings, and schools for a local service or shop. The application provides an option where a user can set a radius from a point of interest on the map to obtain features for every business within that radius. We are working on developing a database of these data points and their features to feed them into data mining algorithms to discover possible correlation with business ratings.

CULTURAL, GENDER AND GLOBAL STUDIES

Sarah Booze, Global Studies, Undergraduate

THE TRUE POWER OF MYTHS: AN ANALYSIS OF THE EFFECTS OF MYTHOLOGY ON JAPANESE NATIONALISM

Faculty Mentor: Jeanne Dubino, Arts and Sciences

This paper analyzes the connection between Japanese mythology and nationalism by answering the question of how Japanese origin myths have affected nationalism in Japan over time. The myths of the creation of Japan and its people created an ideological force which has influenced some of the most momentous events in East Asian and, indeed, world history.

The paper offers specific definitions of the terms "myth" and "nationalism" as these concepts are central to the content of the discussion. It then turns to five key periods in Japanese history which illustrate the varying intensity of mythology-based nationalism.

The research for this paper was conducted via books, journal articles, interviews, and my personal experience. Graphs and pictures are also utilized to illustrate various concepts. In addition to scholarly resources, I include more personal narratives in order to show the human aspect of this topic. By evoking this human side, I hope to show that the importance of mythology goes beyond a historical or religious discourse and can deeply impact people's lives.

The conclusion to my research shows that myths have played a vital role in shaping Japanese society and culture for hundreds of years. By looking at creation myths and their effect on national identity a deeper understanding of the Japanese story can be cultivated. This paper is an illustration of how myths can be formidable forces able to create ideologies powerful enough to shape the course of human history.

Lily Shaw, Sociology, Undergraduate

SWINGING THROUGH SOCIAL CHANGE: DOES LINDY HOP PROMOTE GENDER EQUALITY?

Faculty Mentor: Joseph Gonzalez, Arts and Sciences

Lindy Hop is a type of swing dance that developed in Harlem, New York in 1927. Based in the African American community, it was a dance of freedom and self-expression during a time of oppression. From the 1950's to the early 1980's, Lindy Hop faded from popularity. It is now in a period of revival. Though it is stylistically more or less the same dance, it now exists in the context of present day and faces new social issues. Looking through scholarly sources regarding the current Lindy Hop community, I realized that only one source explored a pressing topic: gender inclusivity in Lindy Hop. My thesis examines the current Lindy Hop community and questions whether or not the Lindy Hop community is as inclusive of gender as they claim to be. Over winter break, I travelled to Sweden, one of the main countries responsible for the revival of the dance. There I conducted ten interviews and observations (with IRB approval) at The Snowball, a weeklong Lindy Hop event. Then, I organize and coded the data to examine reoccurring themes. I expect to conclude that the Lindy Hop community is not as inclusive as it claims to be. I will share my information through my Honors thesis and presentations in different dance and non-dancing communities. I want to provide a resource on how communities can create welcoming spaces and meaningful conversations surrounding gender equality.

GEOGRAPHY AND PLANNING

Lauren Andersen, Geography, Graduate

AN ASSESSMENT OF WILDFIRE VULNERABILITY IN WESTERN NORTH CAROLINA, USA FOLLOWING THE 2016 WILDFIRES

Faculty Mentor: Maggie Sugg, Arts and Sciences

Coauthor(s): Maggie Sugg

In 2016, an intense drought occurred in the southeastern United States. Dry conditions resulted in unprecedented wildfires throughout the southern Appalachian Mountains, specifically in western North Carolina (WNC). Future climate change is expected to increase temperatures, alter precipitation, and stress water resources in the region, which could lead to more frequent drought and wildfire. The increasing threat of destructive wildfires combined with a growing wildland-urban interface indicate a need for a comprehensive assessment of wildfire vulnerability in WNC, while recent wildfires offer an opportunity to evaluate assessment accuracy. The study identifies locations vulnerable to wildfire in WNC. By combining socioeconomic and biophysical data in a geographic information system, specific locations of vulnerability were identified and validated using information about the wildfire outbreak in 2016. The study contributes to vulnerability research by embracing novel techniques through the use of validation. The vulnerability index indicates that quality of life was significantly impacted by the recent wildfires and wildfire vulnerability is greatest in rural, mountainous portions of the region, which are less equipped for mitigation. The results provide transparency to vulnerable communities, as well as enable policymakers to identify opportunities to prepare for resilience by targeting vulnerability hotspots.

Elizabeth Bailey, Geography, Graduate

CLIMATE AND CONFLICT INTERACTIONS: THE RELATIONSHIP BETWEEN CONFLICT SPIKES AND CLIMATE DEVIATIONS IN NORTHERN LATIN AMERICA

Faculty Mentor: Maggie Sugg, Arts and Sciences

Economic downturn, as well as political and social instability are the major known causes of conflict. Climate change and an increase in deviations from average weather occurrences are predicted to increase climate-based conflicts. Recent literature has found significant relationships between deviations in average climate trends and spikes in conflict related deaths in the Middle East and Africa. To date, few studies have ever explored the relationship in Latin America. This study examines the relationship between the Caribbean Sea Surface Temperature Index (CAR SST), drought, temperature, and spikes in conflict throughout multiple nations in the Caribbean and Latin America. The presence of multiple climate zones in this region results in varying responses to changes in sea surface temperature. A significant correlation ($p < 0.05$) was found between fall CAR SST averages and subsequent spikes in conflict. Sea surface temperature was positively correlated with spikes in conflict in arid regions, while tropical regions were negatively correlated with sea surface temperature. Predicting climate and conflict relations can help identify areas more susceptible to conflict, allowing precautionary measures to be put in place to avoid conflict outbursts.

Danielle Boase, Nursing, Undergraduate

WEARABLE SENSORS FOR CONTINUOUS PREGNANCY HEALTH AND ENVIRONMENTAL MONITORING: FROM A PATIENT AND PROVIDER PERSPECTIVE

Faculty Mentor: Maggie Sugg, Arts and Sciences

Coauthor(s): Maggie Sugg, Jennifer Runkle

mHealth is an emerging field that uses mobile technology (i.e., mobile phones and various wireless technologies) to track and monitor a patient's medical health. Few studies have examined the perception of providers and patients with the use of mHealth technology, particularly among pregnant women. This study evaluated the attitudes and perceptions of both patients and providers in using mHealth and wearable technologies during pregnancy. Perception was gauged through an anonymous survey distributed November 15 through December 31, 2016 at the Mountain Area Health Education Center (MAHEC) in western North Carolina, a rural, medically underserved area. Survey responses demonstrated that few providers were currently using mHealth in their clinical practice. In addition, results found that patients had a positive perception towards mHealth and welcomed its implementation into clinical practice, while providers were more positive with regards to mHealth's potential for future diagnostic and surveillance. While adding to the existing literature in that this study found positive perceptions regarding mHealth usage during pregnancy, more in-depth interviews are needed to further assess the reasons why patients and providers made their decisions and to examine how the potential benefits and barriers could affect clinical practice.

Elizabeth Goughnour, Geography, Graduate

VIOLENT CRIME: AN ANALYSIS OF NEW YORK AND CHICAGO

Faculty Mentor: Baker Perry, Arts and Sciences

For decades, violent crime within cities has been difficult to combat for law enforcement agencies. The highest density of violent crime in the United States, which can be defined by homicide, rape, robbery, and aggravated assault, is most often found in large urban areas. The objective of this study is to examine the potential influencers of trends in both cities and identify high density areas of violent crime and homicide through spatial analysis. Examining circumstances that influence violent crime is key to understanding how communities operate and which populations are most affected by violent crime. This analysis using statistical methodology to compare trends in violent crime, with a specific focus on homicides, in New York City and Chicago from 1985-2014. Within this analysis, violent crime is spatially identified alongside the presence of weapons and narcotics upon arrest. Findings show a strong relationship between the number of homicides in both cities until 2010, where Chicago experienced a spike in homicides starting in 2015 while New York showed a steady decline. Understanding where violent crime occurs and whom is most affected, agencies can be easily lead to direct attention to high-crime areas as well as aid communities.

Heather Guy, Geography, Graduate

SUBSEASONAL VARIATIONS OF STABLE WATER ISOTOPES IN TROPICAL ANDEAN PRECIPITATION

Faculty Mentor: Baker Perry, Arts and Sciences

Coauthor(s): Anton Seimon, L. Baker Perry, Bronwen Konecky, Maxwell Rado and Marcos Andrade.

Tropical Andean glaciers are rapidly retreating and understanding how the climate has changed here in the past is key to understanding its future. Limited observations and the lack of a complete understanding of the controls on the isotopic (D, 18O) content of precipitation severely limit paleoclimate reconstructions in this region. This study examines four years of daily observations of D and 18O in precipitation from ten sites in southern Peru and northern Bolivia and focuses on understanding the controls on the subseasonal spatiotemporal variability in 18O during the wet season. These data provide new insights into modern 18O variability at high spatial and temporal. We identify a robust, regionally coherent subseasonal signal of 18O in precipitation that occurs each year with a periodicity of ~15 days. This signal reflects variability in precipitation delivery driven by synoptic conditions, and closely relates to variations in the strength and direction of the South American Low Level Jet and moisture availability directly to the east of the Altiplano. Annual layer snowpacks on high Andean glaciers retain this subseasonal signal, allowing the development of snow-pit age models based on precipitation 18O measurements and demonstrating that region-wide synoptic signals are recorded in the snow. This result has implications for improving paleoclimate reconstructions from tropical Andean ice cores and other paleoclimate records.

Tania Katherine Ita Vargas, Geography, Graduate

SYNOPTIC PATTERNS ASSOCIATED WITH EARLY AND LATE ONSET OF THE WET SEASON IN SOUTHERN PERUVIAN ANDES

Faculty Mentor: Baker Perry, Arts and Sciences

Coauthor(s): L. Baker Perry, Marcos Andrade

In the tropical Andes where a clear distinction between the wet and dry season exists, precipitation is an important atmospheric variable. Not only does it contribute to water supplies that are used in domestic, agriculture and industrial activities, but it is one of the most relevant factors in determining glacier mass balance. Contrary to glaciers located in mid-latitudes, glaciers located in the tropics are more sensitive to changes in precipitation rather than temperature. This is why the onset of the wet season is important because it interrupts the melting period caused by solar intense radiation at the end of dry season. In this study, daily precipitation observations from 1981 to 2010 are analyzed in order to define and identify the onset and end of the wet season as well as its duration and annual variability. Atmospheric fields from the ERA-Interim Reanalysis (0.75° and 6 hours spatial and temporal resolution) are analyzed to determine the configuration and position of the synoptic patterns associated with the onset and end of the wet season. In addition, the 1997-98 El Niño years are analyzed to assess the effect of this phenomenon on an early or late onset of the wet season.

Joseph Jonaitis, Geography, Graduate

SPATIOTEMPORAL VARIABILITY OF PRECIPITATION IN THE TROPICAL ANDES OF SOUTHERN PERU AND BOLIVIA DURING THE 2015-16 STRONG EL NIÑO

Faculty Mentor: Baker Perry, Arts and Sciences

Coauthor(s): L. Baker Perry, Anton Seimon, Marcos F. Andrade-Flores, Maxwell Rado, Heather Guy, Tania Ita

Glaciers in the tropical high Andes of Southern Peru and Bolivia are important sources of freshwater and climate records from ice cores; however, rapid deglaciation has occurred since the 1970's, with some glaciers disappearing altogether. Variability in precipitation and cloud cover, along with well-documented increasing temperatures, have contributed to the negative glacier mass balance across the region. Much of the precipitation and cloud cover variability in the study region has previously been tied to the El Niño Southern Oscillation (ENSO) with the warm (cold) phase of ENSO resulting in less (more) precipitation in this region. Recent investigations in the region, however, have identified important spatiotemporal differences from this previous understanding. This study examines an exceptionally developed set of daily precipitation observations from meteorological stations, a network of citizen scientist observers, airports, a vertically-pointing radar, and high elevation (>5,000 m asl) automated meteorological stations to determine the spatiotemporal patterns of precipitation characteristics (e.g., total precipitation, number of rainy days, onset of wet season, melting layer heights) during the 2015-16 El Niño. Results indicate a complex spatial pattern of precipitation characteristics with several periods of anomalously heavy precipitation coinciding with extremely high melting layer heights (> 5,200 m asl); annual net accumulation at the Quelccaya meteorological station, however, was far below seasonal averages.

April Kaiser, Geography, Graduate

COMPARING WHITEBARK PINE RADIAL GROWTH RESPONSE TO CLIMATE VARIABLES IN THE CASCADES AND SIERRA NEVADA, USA

Faculty Mentor: Saskia van de Gevel, Arts and Sciences

Coauthor(s): Saskia van de Gevel

The endangered whitebark pine (Pinus albicaulis) is an important dendrochronological species due to its long-life span of up to 1,000 years. This study explores the most influential climatic variable on whitebark pine trees located in the Cascades (four sites) and Sierra Nevada mountain ranges (five sites). Whitebark pine radial growth data was collected from the International Tree-Ring Data Bank. We determined whether average temperature, maximum temperature, Palmer Drought Severity Index, or precipitation had the largest influence on whitebark pine radial growth at the nine sites. We explored correlations temporally from 1925-2002 through forward evolutionary interval analysis in DendroClim 2002 software. Both mountain ranges were comparatively analyzed through whitebark pine master chronologies using ANOVA and independent samples t-tests. The most influential climatic variable overall for the nine sites was the Palmer Drought Severity Index. Once separated, average temperature was most influential for the Cascades and Palmer Drought Severity Index for the Sierras. The DendroClim 2002 results support radial growth-climate temporal stability. We found no significant difference in radial growth between both mountain ranges. These dendroclimatic analyses show promise for future climate reconstructions using whitebark pine in the Cascades and Sierras.

Evan Montpellier, Geography, Graduate

RECONSTRUCTING SUMMER UPPER-LEVEL FLOW IN THE NORTHERN ROCKY MOUNTAINS USING AN ALPINE LARCH (LARIX LYALLII) TREE-RING CHRONOLOGY

Faculty Mentor: Peter Soulé, Arts and Sciences

Coauthor(s): Peter Soulé, Paul Knapp, Baker Perry

Variability in synoptic-scale circulation patterns plays an important role in modulating mesoscale meteorology during the climatological summer in the mid-latitudes. Previous research has linked Arctic amplification to alterations in summer synoptic climatology, leading to more extreme weather events in the mid-latitudes. In this study we reconstruct seasonal (JJA) upper-level (500 hPa) atmospheric flow for four geographic locations in the mid-latitudes using an alpine larch (Larix lyallii Parl.) tree ring chronology derived from the Bitterroot wilderness of western Montana. Our goal is to assess the long term stability of upper-level flow in order to place the observed trends in a historical context. We found significant relationships between alpine larch tree growth and upper level flow patterns derived from the North American Reanalysis Dataset. Spatial pattern correlations indicate that tree growth increases when meridional flow and zonal flow are strong west ($r = 0.504$, $p = 0.001$, $n = 37$) and north ($r = 0.642$, $p < 0.001$, $n = 37$) of the study site, respectively. Tree growth declines when meridional flow and zonal flow are strong east ($r = -0.497$, $p = 0.001$, $n = 37$) and south ($r = -0.584$, $p < 0.001$, $n = 37$) of the study site, respectively. Using the leave-one-out method, we calibrated and verified our linear regression models between upper-level flow and tree growth. Our 445 year climate reconstructions of 500hPa flow show that ridging is becoming more intense over time while troughs are declining in intensity.

Kimberly Nelson, Exercise Science, Undergraduate

"A COMPARISON BETWEEN TEMPERATURE EXPOSURE AND PHYSIOLOGICAL RISK FACTORS IN AN OCCUPATIONAL SETTING"

Faculty Mentor: Maggie Sugg, Arts and Sciences

Coauthor(s): Laura Thompson, Maggie Sugg, Jennifer Runkle

Exposure to extreme temperatures has been linked to excess morbidity in the workplace, particularly among workers who spend the majority of their workday outdoors. Emerging technologies such as "wearable" sensors offer a feasible strategy to physiologically monitor the individual response to temperature in the workplace in the context of environmental conditions characterized by extreme temperatures. The objective of this study was to evaluate if risk factors for temperature strain (i.e., BMI, race) or personal ambient temperatures (PAT) are more associated with participant heart rate. Data were obtained from an ongoing study conducted by faculty and students at Appalachian State University (ASU) and North Carolina State University (NCSU) to monitor outdoor workers. Participants were continuously monitored over a 5-day work week by wearing iButtons, Hobo devices, and Garmin watches that captured their ambient temperature, heart rate, and uv exposure. Risk factors for temperature strain were self-reported by a baseline survey administered at the beginning of the data collection period. Relationships between risk factors, PAT, and heart rate will be assessed using a bivariate regression model. The resulting R-squared value will be used to determine which variables are the best predictors. We expect to see higher correlation between temperature and heart rate than the risk factors. Results will be evaluated for different demographics, time periods, and study sites.

Alex O'Neill, Geography, Undergraduate

STORM SCALE ANALYSIS OF TRACE CHEMICAL AND ISOTOPIC CHARACTERISTICS OF QUELCCAYA SNOW PITS

Faculty Mentor: Baker Perry, Arts and Sciences

Coauthor(s): L. Baker Perry, Heather Guy, Anton Seimon, and Mariusz Potocki

The Quelccaya icecap is one of the most important paleoarchives in the tropics as a result of the annually-resolved 1500-yr ice core record. Previous analysis of these ice cores was performed with ~1cm resolution or larger, which is fine enough to perform annual layer scale analysis but does not lend insight into subseasonal or storm-scale meteorological processes. However, the cutting-edge laser ablation technology pioneered by the Climate Change Institute at the University of Maine now makes it possible to analyze ice core data at storm-scale (μm) resolution. Previous analyses of snow pits collected on the Quelccaya icecap using δ18O isotopes and citizen science precipitation observations have demonstrated that there is a link between subseasonal meteorology and δ18O in the snow. While these isotopes are effective markers of sub-seasonal and annual accumulation, collecting and analyzing them is a destructive process with at best ~5mm resolution. This poster analyzes the feasibility of linking isotopic markers (δ18O) and trace element/chemical readings. These chemical markers have the potential to act as a proxy for isotopic analysis on ice cores, eliminating the need for destructive analysis of the isotopes. Additionally, these chemicals are analyzed at the μm resolution, potentially allowing the development of storm scale age models. Initial analysis of the 2016 Quelccaya snow pit data shows similar trends in δ18O and two trace elements (Ca44 & Cd111).

Zachary Osborne, Geography, Graduate

GEOGRAPHIC INQUIRY IN NORTH CAROLINA: AN ASSESSMENT OF TECHNOLOGY IN K-12 GEOGRAPHY EDUCATION

Faculty Mentor: Saskia van de Gevel, Arts and Sciences

Coauthor(s): Saskia van de Gevel

Geography education is often grouped with history and other disciplines in K-12 schools in North Carolina, limiting student exposure to the process of geographic inquiry. With the current growth of geospatial technologies in North Carolina, K-12 students exposed to geography have the opportunity to learn about research questions and geography career opportunities. Our objective was to learn how geography and geospatial technologies are taught in K-12 instruction. We explored the current implementation of geographic education in North Carolina through a 44-question survey. We received 66 completed responses from North Carolina educators. Educators shared their teaching methods, geospatial technology integration, and professional development experience. Information regarding academic training, background exposures, and socio-economic influences on the classroom were also integrated into the survey. Results illustrate the lack of geographic inquiry and associated knowledge gaps in North Carolina. The survey can be applied as a model in other states to assess successes and challenges with K-12 geography education.

Laura Thompson, Geography, Graduate

ADOLESCENTS IN CRISIS: A GEOGRAPHIC EXPLORATION OF HELP-SEEKING FOR MENTAL DISTRESS USING DATA FROM CRISIS TEXT LINE

Faculty Mentor: Maggie Sugg, Arts and Sciences

Coauthor(s): Maggie Sugg, Jennifer Runkle

Prior research has demonstrated that a variety of demographic, socioeconomic, and environmental factors can influence the prevalence and severity of mental distress and whether an individual is likely to receive treatment. In response to the growing prevalence of technology mediated crisis counseling services, this county-level study evaluated whether these same disparities exist for help-seeking via Crisis Text Line, a free, ubiquitous, technology-based crisis counseling service. To date, this is the first study to examine text-based help-seeking behavior among adolescents at a national scale. Results identify several factors that are associated with increased or reduced help-seeking behavior among adolescents in the U.S. Rurality was the strongest predictor for low rates of help-seeking. This finding is particularly concerning in light of elevated rates of suicide among rural counties. Low rates of help-seeking compound ongoing rural-urban disparities in traditional mental health services. Further, this finding suggests that increased suicide risk in rural areas cannot be explained by mental health professional shortages alone. Rural communities, particularly those with low support-seeking behavior and comparatively high suicide rates, should should be the target of future research and outreach.

Matthew Wilson, Geography, Undergraduate

A SOCIO-ECOLOGICAL AND SPATIAL ANALYSIS OF NURSING HOME VULNERABILITY IN THE SOUTHEASTERN UNITED STATES

Faculty Mentor: Maggie Sugg, Arts and Sciences

Coauthor(s): Lauren M. Andersen, Maggie M. Sugg, Sandi J. Lane

Over the last decade there has been a measurable increase in the number of billion-dollar weather disasters occurring in the United States. According to NOAA (2018), the United States experienced 16 different billion-dollar natural disasters in 2017 alone. In the aftermath of these events, older adults are often disproportionately negatively impacted. Older adults are inherently vulnerable to natural disasters due to their frail condition, frequency of comorbid conditions and need for assistance with activities of daily living. Investigations into the disproportionate harm experienced by older adults following hazardous geophysical conditions recently emerged into public discourse after Hurricane Harvey where institutionalized older adults were trapped in waist-deep flood waters while emergency services responded to other locations. To mitigate this harm an understanding of the potential hazards impacting each nursing home location, is necessary. The spatial vulnerability of nursing homes located in the Southeastern United States was assessed using a social-ecological approach of vulnerability theory and GIScience. Principal components analysis (PCA) was conducted to reduce multicollinearity between 21 socioeconomic and 13 geophysical variables. PCA component scores were combined at the county level and mapped in a geographic information system to identify the spatial distribution of vulnerability. The identification of vulnerable areas allows for further investigation into the resilience of each nursing home location.

GEOLOGICAL AND ENVIRONMENTAL SCIENCES

Morgan Baker, Geology, Undergraduate

DETERMINING THE ANNEALING CURVE OF RADIATION HALOS IN QUARTZ GRAINS THROUGH HEATING EXPERIMENTS

Faculty Mentor: Gabriele Casale, Arts and Sciences

Coauthor(s): Gabriele Casale

Quartz grains in rocks such as quartzite and quartz sandstone, commonly contain zircon inclusions. Zircon regularly contains uranium, an element that radioactively decays over time and leaves a radiation damage halo in the quartz grain. This radiation damage halo can be seen in cathodoluminescence scanning electron microscopy. Preservation of radiation damage is temperature sensitive and halos are annealed when the quartz grain is heated. By determining the temperature of quartz radiation damage annealing we can distinguish between a natural rock sample that has been subject to heat at or above the annealing temperature from one that has not. In order to determine this annealing temperature, we selected rocks that are known to contain quartz with zircon inclusions. We cut these rocks into small blocks, polished, then heated them in a furnace at varying temperatures and times from 200°C to 1000°C and 20-100 hours, and observed noted the presence or absence of damage halos using the cathodoluminescence detector in the SEM, to ascertain whether or not the annealing temperature/time had been reached. This series of steps allows us to bracket the temperature at which radiation damage halos are annealed. Previous studies have shown that above 800 °C, radiation damage in quartz is completely annealed; however, our results have demonstrated that radiation damage is completely annealed at 600°C. This study is the first step in developing a new geothermometric system that can be applied to geologic studies.

Tristan BeDell, Geology, Undergraduate

FIELD AND THERMOCHRONOMETRIC CONSTRAINTS ON MOTION ALONG THE FRIES AND GOSSAN LEAD FAULTS, NEAR BOONE, NC

Faculty Mentor: Jamie Levine, Arts and Sciences

Coauthor(s): Albert Herrera Ventura, Jame S.F. Levine, and Gabriele Casale

The Eastern Blue Ridge (EBR) in the Appalachian Mountains spans from Alabama to Virginia. The Gossan Lead fault marks the edge of the EBR in western North Carolina; just north of the Grandfather Mountain Window this boundary is complicated by the nearby Fries fault. While previously mapped, the exact location and intersection of these faults, along with timing of faulting, is unknown. We carried out extensive geologic mapping in the Boone quadrangle, determined kinematics of the faults, and collected samples for 40Ar/39Ar hornblende and muscovite thermochronology. The northernmost mapping area was dominated by the amphibolites and schists of the Ashe Metamorphic Suite (AMS). The AMS is separated from the Pumpkin Patch Formation (PPF) amphibolites to the south by the northeast-dipping Gossan Lead fault. South of the PPF is the feldspathic Cranberry Gneiss, which are separated by the north-dipping Fries fault. The Cranberry Gneiss is separated from the metasedimentary rocks of the Grandfather Mountain Formation to the south by the Linville Falls fault. Rocks in the field area generally strike to the NW, and dip moderately to the NE. Increased strain at contacts show evidence for faulting in these areas, with most shear sense indicators being consistent with thrust faulting. A hornblende 40Ar/39Ar age from the AMS is consistent with cooling at ~340 Ma. Our field observations and results from hornblende 40Ar/39Ar thermochronology show that these thrust faults were likely active during late Neo-Acadian to pre-Alleghenian time.

Nickolas Brand, Geology, Undergraduate

THE ELASMOBRANCH (CHONDRICHTHYES: SHARKS AND RAYS) PALEOFAUNAL ASSEMBLAGE OF THE UPPER CRETACEOUS WILLIAMS FORK FORMATION (NORTHWESTERN COLORADO): RECONSTRUCTING A 72 MILLION YEAR OLD BRACKISH WATER ECOSYSTEM

Faculty Mentor: Andrew Heckert, Arts and Sciences

Coauthor(s): Andrew Heckert, John Foster, ReBecca Hunt-Foster

The Williams Fork Formation (WFF) is an understudied member of the Upper Cretaceous Mesaverde Group. We collected microvertebrate fossil-bearing matrix from the J&M Site, a locality near Rangely, in N.W. Colorado. Although relatively few marine taxa were known from the WFF, we report multiple species that represent a clear marine influence at the J&M site. The selachian taxa Chilloscyllium sp. and Cantioscyllium markaguntensis represent marine members of the Late Campanian ecosystem and are new records for the WFF. An indeterminate Lonchidion species is present at the site, and is the report of this taxa from the Williams Fork Fm. The teeth are similar in morphology to Lonchidion griffisi, which is also known from the Mesaverde Group, but may represent a new, distinct, species. L. griffisi is known exclusively from estuarine sites. Batoid shark fossils are present in great abundance. We confirm the presence of the guitarfish Myledaphus bipartitus at the J&M site. The rays Cristomylus sp. and Pseudomyledaphus sp. are present at the site, and new records for the WFF. These three taxa represent a freshwater environment, and account for the majority (~64%) of our recovered elasmobranch fossils at the J&M site. While most of the fossils collected from the J&M site (osteichthyan and reptilian) represent a freshwater environment, there is undeniable marine influence from the Western Interior Seaway that can be inferred from chondrichthyan taxa new to the Williams Fork Formation.

Kevin Bynum, Geology, Undergraduate

ANCIENT SOILS AND THEIR ROLE IN RECONSTRUCTING PALEOCLIMATE: STRATIGRAPHIC INTERPRETATION AND BULK GEOCHEMICAL ANALYSIS OF A MIOCENE FOSSIL SITE IN KENYA

Faculty Mentor: Cynthia Liutkus-Pierce, Arts and Sciences

Coauthor(s): Alexis Chaize, Cynthia Liutkus-Pierce

During fieldwork in Loperot, Kenya, we excavated a ~28m trench that exposed 30 units of Miocene sedimentary rocks. Facies fluctuate between fluvial sandstones and paleosol mudstones, and indicate several localized shifts in paleoenvironment from river to floodplain, respectively. Because soils are a product of weathering and environmental conditions (temperature and humidity), the bulk geochemistry of paleosols can provide crucial information about the conditions under which they formed. Using X-ray fluorescence (XRF), we characterized the geochemical signature of seven paleosols and used those data to characterize the degree of weathering (CIA and CIA-K) and reconstruct mean annual precipitation (MAP).

CIA ratios quantify the amount of mobile cations (Ca, Mg, Na, and K) within a paleosol sample. Our results indicate that the Loperot paleosols contain abundant mobile cations (CIA > 1) and are alkaline, suggesting poor soil formation under arid conditions. Calculated MAP results (using CIA-K) support the CIA data and reconstruct mean annual precipitation during the Early Miocene as <675mm/yr (semi-arid).

When plotted up-section, MAP values calculated for each paleosol unit within the trench indicate that climate (namely precipitation) did not change over time. We therefore assert that the paleoenvironmental shift recorded by the Loperot sediments (i.e., the migration of the river) was not a result of climate change and was instead more likely caused by tectonics.

William Cheek, Geology, Undergraduate

SOUTH FORK NEW RIVER STREAM DISCHARGE ANALYSIS

Faculty Mentor: William Anderson, Arts and Sciences

The ASU Research and Education Wellfield was drilled in 2010 along the Town of Boone Greenway. It includes 16 monitoring wells, which have been used to study the interactions between the riparian aquifer and the South Fork New River. As a broader part of this research, stream levels have been monitored and stream discharge rates have been estimated to better understand aquifer-stream interactions. Two stream gauges have been used at the site: one directly in the stream, and the other through the use of a stilling well. Conversions of stream stage to stream discharge require the use of a rating curve. We utilized three methods to develop our curve. The first two, a handheld SonTek acoustic Doppler flow meter and a StreamPro ADCP floating flow meter, were used to directly measure stream discharge at low flow levels at known stages. The third, an indirect method, was developed using Manning's Equation. This process involved surveying the site to map the stream-bed profile and to estimate the cross-sectional area at various stream stages, find the channel slope of the stream, and to estimate an appropriate stream-bed roughness coefficient. These three methods have enabled us to develop a rating curve that accurately estimates stream discharge. Recently, an automated datalogger was installed in the stilling well at the site to measure water level every 15 minutes. These data, which are sent to us every four hours, give us the ability to calculate stream discharge in near real-time.

Austin Deans, Geology, Undergraduate

NEW LATE CRETACEOUS (EARLY CAMPANIAN) MICROFOSSIL ASSEMBLAGE FROM THE UPPER CRETACEOUS OF NEW MEXICO

Faculty Mentor: Andrew Heckert, Arts and Sciences

Coauthor(s): Amanda Hendrix, Caleb Lewis, Spencer Lucas, Alex Harrison, Andrew Heckert

The marine deposits of the Cretaceous western interior seaway in New Mexico preserve abundant fossil taxa, ranging the entire Cretaceous. In this poster we compare fossils from an exceptionally rich early Campanian Menefee Formation locality (NMMNH L-5636) to both older marine assemblages and nonmarine assemblages of the younger Fruitland and Kirtland formations. Most of the fossils were found in an intraformational clay-pebble conglomerate lag that is locally bone-bearing, and were collected and screenwashed with nested sieves. Thousands of identifiable fossils were recovered, of which about 85% of fossils are fish (Chondrichthyes and Osteichthyes). Chondrichthyan taxa we report include Cristomylus, Lonchidion, Carcharias, Scapanorhynchus, and Cretodus. Osteichthyan taxa include Paralbula, Melvius, and indeterminate lepososteid and pycnodontid teeth. The geology of the locality physically resembles the Menefee Formation, although recent geologic maps depict the site as lying within the overlying Lewis Shale. The fossiliferous horizon is primarily composed of crossbedded sandstone (lithic wacke) with bentonitic mudstone interbeds, as well as some strata containing lignite or siderite nodules, which suggest fluvio-deltaic environments. However, many of the recovered taxa, including most of the sharks and some osteichthyans, point to significant marine influence. In the same horizon nearby is a log riddled with Teredolites, further supporting our inference of marine influence.

Yanelis Delgado, Geology, Undergraduate

DETAILED 3D MODELS OF A JUVENILE FOSSIL REPTILE FROM THE UPPER TRIASSIC OF NORTH CAROLINA CREATED USING AGISOFT AND A KEYENCE 3D MICROSCOPE

Faculty Mentor: Andrew Heckert, Arts and Sciences

Coauthor(s): Andrew Heckert

Agisoft is a widely used program for creating 3D models of fossilized specimens from high-quality digital camera images of small fossils with 2/3 overlap. For this project, we used Agisoft to develop detailed 3D models of a tiny (7 cm) skeleton of a fossil reptile embedded in sandstone matrix. Because of the specimen's size, we used a Keyence 3D microscope with the camera set at 30° from vertical. Even then the specimen was too big to fit entirely in the field of view, so the stage was moved horizontally to achieve overlay. Changing the angle of the camera in the Keyence slightly lowers the resolution of the picture; therefore, cropping or masking the out-of-focus areas of the images gave better results for the models. The pictures were also taken with a physical scale that had to be placed on the sandstone and subsequently masked out because digital scales further complicated the models. We processed the images at high resolution and ultra-high resolution. The high resolution provided a high-quality model for 3D printing but did not provide sufficient texture on the digital visualization. In comparison, the ultra-high resolution took much longer to process but provided an ideal quality for the digital texture and the best quality for printing a 3D model. Using the Keyence microscope for photogrammetry has proved to be a viable method for making 3D models of small specimens, although each specimen requires its own adjustments for optimal results.

Jacob Dorsett, Geology, Undergraduate

WHERE IS THE SOUTHERN END OF THE SAN ANDREAS FAULT? A PHYSICS-BASED MODELING STUDY

Faculty Mentor: Scott Marshall, Arts and Sciences

Coauthor(s): Scott Marshall, Elizabeth Madden, Michele Cooke

The San Andreas fault (SAF) is the main structure that divides the Pacific and North American tectonic plates. While the SAF is very well studied, there is no consensus as to how and where it terminates in the south. Here, we focus on the Imperial Valley, near the California-Mexico border, where the SAF has been hypothesized to end at the Salton Sea. To determine if the southern SAF terminates or makes connections with other regional faults, we have created a series of physics-based models based on the Southern California Earthquake Center's Community Fault Model. The models are driven by tectonic plate motions measured by GPS and are used to calculate the distribution of slip along each modeled fault. To test the results, we compare slip rates from existing geologic studies to the model predictions. We find that the model using a terminated SAF geometry predicts geologically implausible slip rates for several key regional faults. Most notably, it predicts 5.0 mm/yr of slip across the Imperial fault compared to the geologic estimate of 15-40 mm/yr. We then create a suite of additional models with various proposed connectors between the SAF and other major structures in the region. The model that best fits data has the SAF connected directly to the Imperial fault which is then connected to the Cerro Prieto fault. In this model, the three faults all link together and act as a single large fault structure, carrying significant implications for future earthquake hazards.

Matthew Eads, Geology, Secondary Education, Undergraduate

TAKING A BITE OUT OF PLATINUM AND TIN-BASED SILICONE RUBBER LIFE CLAIMS

Faculty Mentor: Andrew Heckert, Arts and Sciences

Coauthor(s): Andrew Heckert

Platinum (PB) and tin-based (TB) silicone rubbers are two materials employed in making molds for replicating fossils. PB molds are advertised to last for years under occasional use but are not intended for mass production, whereas TB molds are ideal for mass production. The goal of this project is to assess if TB is actually better than PB under constant stress and heat. The PB mold used was Mold Star 16 FAST and the TB mold used was Mold Max 10:1. The casting agent was Smooth-Cast 320, a two part liquid plastic that sets in 15 minutes. We chose to mold a tooth of the shark Carcharocles megalodon for our comparison. Over a three-day period each mold was poured every ten minutes to keep the mold under constant stress. Due to the plastic reaching 140 degrees Fahrenheit the internal temperature of the mold is kept high presumably expediting degradation. The PB mold did not begin to experience major tearing until cast 68, whereas the TB mold began experiencing major tearing at cast 42. Over the first 40 casts the TB cast quality was significantly better than the PB, however the PB could handle 68 casts before major degradation. From these results the PB mold is actually better at creating outreach models over a short amount of time, which directly contrasts with the claims that TB molds are better for mass production.

Emily Fedders, Geology, Undergraduate

MODELING AIR TEMPERATURE/WATER TEMPERATURE RELATIONS ALONG A SMALL MOUNTAIN STREAM UNDER INCREASING URBAN INFLUENCE

Faculty Mentor: William Anderson, Arts and Sciences

Coauthor(s): William P. Anderson, Jr., Anthony M. Hengst, Chuanhui Gu

Boone Creek is a headwater stream flowing through the Appalachian State University campus in Boone, North Carolina. Urbanization, including impervious surface coverage, culverting, bank armoring, and riparian vegetation reduction, increases from upstream to downstream along our 1.9 km study reach. Previous studies show this urbanization causes downstream thermal instability on minute to hourly timescales. This study investigates urbanization's effects on stream thermal regime at daily to yearly timescales.

We developed an analytical model of daily average stream temperatures based on daily average air temperatures after Caissie et al. (2001) with alterations to better fit the thermal dynamics of our small stream. Optimizing the model for each year of study site data (78 site-years total) gave annual thermal exchange coefficients (K) quantifying the strength of the air temperature water temperature connection for each site.

In a gaining stream like Boone Creek, K values are expected to decrease downstream as discharge volume and thermal inertia increase. However, interannual average K values in the study reach increase from 0.112 upstream to 0.149 downstream despite a doubling of discharge. Regressional analysis reveals downstream K values increase along-stream an order of magnitude faster than upstream K values indicating a tipping point in the stream temperature/water temperature relationship at which urbanization overpowers stream thermal inertia.

Glen Gonzalez, Geology, Undergraduate

OLD VS. NEW: A COMPARISON OF FOSSIL REPLICATION TECHNIQUES

Faculty Mentor: Andrew Heckert, Arts and Sciences

Coauthor(s): Andrew Heckert, Brian Zimmer

When duplicating a fossil for public outreach or research, paleontologists and fossil prepators use different techniques, such as molding and casting, in order to accurately replicate the specimen. With modern technology, 3D modeling and printing can prove to be an effective alternative to displaying similar detail as the original specimen, but effective comparisons between methods in paleontology are rare. In our study, we generated a 3D model of a tooth of the giant shark Carcharocles megalodon using a Nikon camera and the computer program Agisoft Photoscan. After completion of the 3D model, the file was converted into a .stl file to be used for 3D printing. We measured the 3D model, 3D print and a cast made from Smooth-Cast® 320 liquid plastic poured in a Mold Star™ 16 FAST platinum mold and compared them to the original specimen, taking into consideration changes in length and width. Our research shows that the models were almost similar to, but did not exactly replicate, the actual specimen. The average percent error was less than 5% for all dimensions. Qualitatively, the 3D model depicts the original specimen most accurately. Applications in 3D modeling and printing are diverse and can be employed with professionals working with specimens from long distance without losing visual quality, and without the risk of damaging a specimen through delivery services. Molding and Casting techniques are proven methods that provide quick replicas. These methods should be considered for individuals interested in fossil replication.

Daniel Govert, Geology, Undergraduate

STRONTIUM ISOTOPE (87SR/86SR) STRATIGRAPHY OF LOWER DEVONIAN CARBONATE ROCKS FROM THE GREAT BASIN REGION: TESTING SR ISOTOPE METHODS USING CONODONT APATITE AND BULK CARBONATE

Faculty Mentor: Cole Edwards, Arts and Sciences

Coauthor(s): Cole Edwards

The Phanerozoic strontium isotopic (87Sr/86Sr) seawater curve is constructed using a variety of geologic materials including calcite fossils, carbonate rocks, and phosphatic bioclasts. Brachiopods, for example, are useful in preserving seawater 87Sr/86Sr values because evidence for recrystallization of prismatic shell material can be easily confirmed using scanning electron microscopy, and brachiopod shells are chemically stable under most conditions. However, brachiopods are susceptible to preservational biases. If this occurs one can use bulk carbonate rock or other fossils to estimate seawater 87Sr/86Sr. This study tests the hypothesis that Devonian conodont (bioapatite) and bulk carbonate samples can provide estimates for seawater 87Sr/86Sr. Nineteen bulk carbonate and three conodont samples collected from the Great Basin region (central Nevada) were measured to compare with a brachiopod-based 87Sr/86Sr curve. Preliminary bulk carbonate data show that Devonian 87Sr/86Sr values decrease from 0.7101 to 0.7088, slightly more radiogenic than the brachiopod-based curve that decreases from 0.7087 to 0.7081. This suggests that bulk rock preserves a similar seawater 87Sr/86Sr trend but it is not reliable for absolute seawater 87Sr/86Sr values. Ongoing analysis of conodonts will show whether conodont-based 87Sr/86Sr data from the Lower Devonian can be used to substitute for brachiopod-based data, or if brachiopods are preferred for future Paleozoic 87Sr/86Sr studies.

Nicholas Hammond, Environmental Science, Undergraduate

EFFECT OF SOIL ORGANIC CARBON CONTENT ON RIPARIAN NITRATE ATTENUATION DURING STREAM STAGE FLUCTUATIONS

Faculty Mentor: Sarah Evans, Arts and Sciences

Coauthor(s): Chuanhui Gu, Sarah Evans

Riparian zones occur at the interface between surface water and groundwater. Denitrification is an important natural process occurring in riparian zones where nitrate pollution in streams and groundwater is removed. Stream stage fluctuations leading to increased bank storage have a strong effect on the removal of river-borne nitrate through anaerobic microbial denitrification, referred to as "hot moments." Since the availability of oxygen and organic carbon are considered to exert the greatest control, denitrification can be significant when the water table rises to reach the organic carbon-rich topsoils. Previous studies on denitrification during hot moments have focused on hydrologic controls as well as stream dissolved organic carbon input. This study expands upon this knowledge by examining the relationship between the depth profile of soil organic carbon and the rate of denitrification in the riparian zone during hot moments using a two-dimensional cross-sectional groundwater flow (MODFLOW) and transport (MT3D) model. The model is applied to simulate hyporheic exchange and nitrate removal over periods of stream stage rise and fall using data from Boone Creek in Boone, North Carolina. We treat the nitrate decay constant as a proxy for soil organic carbon content and subsequently model the transport and removal of nitrate in the riparian zone. Results from this simulation will provide insight into the importance of topsoil in controlling the removal of nitrate from both surface water and groundwater.

Amanda Hendrix, Geology, Undergraduate

REVISITING THE ALLISON MEMBER OF THE MENEFEE FORMATION (UPPER CRETACEOUS: EARLY CAMPANIAN), SAN JUAN BASIN, NEW MEXICO

Faculty Mentor: Andrew Heckert, Arts and Sciences

Coauthor(s): Austin M. Deans, Caleb Lewis, Spencer G. Lucas, A. Alex Harrison, Andrew B. Heckert

The Menefee Formation of northwestern New Mexico records a Late Cretaceous deltaic floodplain. The Allison Member consists of alternating sandstones and coal bearing mudstones indicative of a freshwater-to-brackish environment and contains the microfossil bearing localities NMMNH L-5636 and L-5635. Here we provide updated data on microfossils from several tetrapod taxa. An albanerpetonid-like batrachian dentary and the presence of turtle shell fragments reinforce past hypotheses of a floodplain environment. Osteoderms and teeth belonging to a Brachychampsa-like alligatoroid are the most abundant tetrapod fossils collected. However, two crocodilian teeth differ morphologically, suggesting two or more genera of crocodilians occupying multiple niches within the ecosystem. Features of these recently collected teeth suggest a larger, hypercarnivorous taxon. Ornithischian teeth include fragments belonging to Hadrosauridae indet., and previously recorded indeterminate centrosaurine skeletal elements suggest greater diversity. A diverse set of theropod teeth, representing a dromaeosaurid and two species of troodontids, further increase the known diversity. Mammals are represented by several multituberculate teeth, two marsupial teeth, and two metatherian mammal premolars. These discoveries represent the oldest mammalian fossils known from New Mexico. This data provides a more thorough understanding of a Menefee ecosystem during a poorly documented interval in the Late Cretaceous.

William Lamb, Geology, Undergraduate

TESTING WHETHER LATE ORDOVICIAN CARBON ISOTOPE EXCURSIONS RECORD RAPID VARIATIONS IN THE GLOBAL CARBON CYCLE

Faculty Mentor: Cole Edwards, Arts and Sciences

Coauthor(s): Cole Edwards

Carbonate rocks are used to study changes in the global carbon cycle throughout Earth history by measuring their carbon isotopic composition (δ13C) as a proxy for ancient seawater chemistry. Standard methods measure the δ13C from a single drill hole to represent that rock. Drawing interpretations from these single data points, however, could be tenuous without documenting the degree of alteration.

A published δ13C trend measured from Ordovician (~450 myr old) carbonate rocks records several positive δ13C excursions interpreted to represent carbon cycle perturbations. High-resolution re-sampling of these rocks was done to test whether these reported δ13C excursions are reproducible or artifacts of alteration. Re-evaluation of twelve samples shows δ13C values differ by 0.03–2.51‰ from published values. Petrographic analysis of thin sections using cathodoluminescence microscopy shows evidence of alteration in all studied samples with several stages of cementation, which may have different δ13C values compared to bulk carbonate material. Inadvertent sampling of these phases could explain apparent rapid fluctuations in δ13C, questioning whether published positive δ13C excursions are representative of Late Ordovician seawater. Results suggest that alteration can produce variable δ13C from a single succession, which has implications for studies that correlate rapid δ13C excursions based on a few data points without adequate screening to characterize alteration effects.

Carly Maas, Geology, Undergraduate

MICRO-WETLAND IN URBAN TOPOGRAPHY TO MITIGATE SALT CONTAMINATION

Faculty Mentor: William Anderson, Arts and Sciences

Coauthor(s): William Anderson, Emily Fedders

Boone Creek is a gaining stream that drains a 5.2 km2 watershed in Boone, North Carolina. Road salt use during winter months enters the stream via surface-water runoff during melt or precipitation events. High stream levels during runoff events reverses aquifer gradients near the stream, causing salt transport into the aquifer. Salt returns to the stream during baseflow conditions, causing chronically-elevated stream salinity values. Within the watershed, a wetland has formed over the past few years within a concrete culvert draining to Boone Creek. For the past six months we have measured electrical conductivity, an analog for salinity, using hand-held probes, dataloggers, and analyzed water samples. We modeled groundwater flow and solute transport through the wetland using the finite-element model FEFLOW. Our data and simulations suggest that the wetland functions as a small aquifer which reduces peak runoff salinities during salt events through processes similar to those in the riparian aquifer. The wetland acts as a temporary buffer, decreasing peak salinity levels in water discharging from the wetland to Boone Creek and attenuating its arrival. The studied wetland formed naturally, but our data demonstrates that the creation of mini-wetlands along storm sewer systems has strong potential to reduce acute (one-hour average Cl- values of 860 mg/L) and chronic (four-day average Cl- values of 230 mg/L) chloride contamination in receiving streams.

Kayla Mitchell, Geology, Undergraduate

COMPARISON OF LATE PLEISTOCENE ICE RAFTING RECORDS WITHIN THE NE PACIFIC

Faculty Mentor: Ellen Cowan, Arts and Sciences

Coauthor(s): Ellen Cowan

During the last Ice Age, glaciers eroded and deposited a massive amount of sediment in the northeast Pacific Ocean. The Integrated Ocean Drilling Program Expedition 341 drilled sites in the northeast Pacific to examine the sedimentary record formed during this climatic period. Site U1417 was drilled in deep water, Site U1421 at the mouth of the Bering Trough on the Alaskan upper slope, and Site U1419 further north on the continental slope. For all sites, ice-rafted debris mass accumulation rates (IRD MAR) were calculated and plotted against radiocarbon-dated timescales. For the purpose of data comparison, IRD MAR curves were subdivided into time periods showing consistent patterns. These periods were interpreted to describe ice-rafting history and account for any discrepancies in the curves between the three sites. Variance in the curves result from glacial and oceanic factors, including ocean circulation, phases of glacial advance/retreat, sea surface temperature, sea ice, and sea level change. The composition of rock fragments from Sites U1417 and U1419 were identified using a petrographic microscope to determine IRD source material for the sites over time and whether they reflect the Bering Glacier's drainage basin. Variable compositions may reflect survivability of icebergs or different glacial sources for icebergs within SE Alaska. All rock fragments analyzed in IRD at Site U1417 can be traced to coastal Alaskan bedrock.

Olivia Paschall, Geology, Undergraduate

87SR/86SR ACROSS THE DEVONIAN-CARBONIFEROUS TRANSITION WITHIN THE PHO HAN FORMATION, CAT BA ISLAND, VIETNAM: NEW DATA OUTSIDE OF AN OLD OROGENY

Faculty Mentor: Sarah Carmichael, Arts and Sciences

Coauthor(s): Sarah Carmichael, Allison Dombrowski, Cameron Batchelor, Drew Coleman, Johnny Waters, and Peter Konigshof

The Devonian-Carboniferous (D-C) transition is a period of mass extinction and rapid global faunal changes that affected both marine and terrestrial ecosystems. There is very little continuous 87Sr/86Sr isotope data for this time due to unconformities or alteration in many sections. Conodont biostratigraphy indicates that the D-C boundary is present within the Pho Han Formation on Cat Ba Island in northeastern Vietnam. This unit was deposited on the South China carbonate platform, and has continuous sedimentation across the D-C boundary. Whole rock geochemistry indicates increased clastic input at the D-C transition, potentially due to the regression observed in many localities around the world. New 87Sr/86Sr measurements of carbonate across the D-C boundary in the Pho Han Formation indicate oscillating fluctuations from 0.708052 to 0.708672. Many of these values are within the McArthur et al. (2012) LOWESS fit for seawater. A lack of correlation between 87Sr/86Sr values with whole rock geochemistry and δ18O isotope values across the section suggests that these 87Sr/86Sr values are not due to clastic contamination and that the samples have not experienced major alteration. The continuous sedimentation in this section and its location in an area far from the Variscan orogeny make this unit a valuable site in which to compare 87Sr/86Sr ratios to existing studies in Europe and North America which experienced substantial sediment shedding from the Appalachian Mountains.

Nicholas Powell, Geology, Undergraduate

MICROSTRUCTURAL IMPLICATIONS ON CONDITIONS OF DOMING IN THE TOXAWAY DOME, EASTERN BLUE RIDGE

Faculty Mentor: Jamie Levine, Arts and Sciences

Coauthor(s): Jamie Levine, Gabriele Casale, Claire Martin

The Toxaway Dome (TD) is an elongate gneiss dome located west of Brevard, NC. Its interior is primarily Toxaway Gneiss, a Grenville-aged (~1090-980 Ma) banded granitic gneiss, and it is mantled by the metasedimentary Tallulah Falls Formation. We present data obtained from microstructural analysis to suggest new constraints on the conditions of doming. Deformation temperatures range from 500-700 °C both within and outside the dome, based on quartz and feldspar microstructures. Most samples record temperatures ranging from 550-650 °C with no spatial pattern given by the temperature data. Additionally, adjacent samples from inside and outside the dome commonly show differing temperatures. Closely examining deformation microstructures, we observe the presence of high-strain fabrics in rocks along the boundary of the TD. These fabrics are not limited to the eastern boundary, which is close to the Brevard Fault, but are also found along the western boundary. Previous studies based on detailed field observations suggested doming occurred as a result of multiple folding events. The presence of high-strain fabrics along the western margin of the TD and the contrasting deformation temperatures across the boundary of the TD suggest faulting contributed to doming. To further constrain doming conditions, we are conducting monazite geochronology to determine the timing of high-strain fabric formation as well as thermobarometric analysis to derive peak metamorphic conditions for the TD.

Skyler Ray, Geology, Undergraduate

COMPARISON OF MODERN ATLANTIC SHELF SEDIMENTS TO CAMBRIAN (515 MA) CLASTIC SEDIMENTARY ROCKS IN THE SOUTHERN APPALACHIANS

Faculty Mentor: Steve Hageman, Arts and Sciences

The Erwin Formation is an early Cambrian shoreline and shallow-shelf deposit on the proto-Atlantic (Iapetus) coastline. It is part of a transgressive sequence in the Appalachian region stretching from Georgia to Pennsylvania and is part of the Chilhowee Group. The Erwin Formation is divided into four members: Nebo Quartzite, Murray Shale, Hesse Quartzite, and Helenmode Member. These members can be distinguished by sediment type, grain size, and sedimentary structures, which characterize the environments of deposition of each member. Comparison of the Cambrian sequence and modern Atlantic shelf deposits, a potential modern shelf deposit analog, support the idea that the Erwin formation was developed by shifting quartz sand ridges with finer silts in between on a reworked shelf environment developed on a passive margin. Cross-stratification from megaripple and interbedded sandstone and clay layers are found in both sequences indicative of a waning storm and fair weather environment. However, the modern Atlantic deposits consist of large, kilometer length ridges and troughs that would not be observable in the rock record, even if present because of limited exposure to the sequence. Comparing the modern Atlantic coastline to the ancient coastline of Appalachian sediments will help us to achieve a better understanding of the proto-Atlantic shelf deposits and possibly identify the ancient environmental and climatic conditions that created the Erwin Formation 515 million years ago.

Delaney Ryan, Geology, Undergraduate

THE GOBE IN THE SOUTHERN APPALACHIAN MOUNTAINS: A RECORD OF INVERTEBRATE FOSSIL MORPHOLOGY DISPARITY

Faculty Mentor: Steve Hageman, Arts and Sciences

The 465 million-year-old Benbolt Formation, located in the southern Appalachian Mountains in Virginia and Tennessee, is a Middle Ordovician tropic to subtropic marine shelf deposit that records the Great Ordovician Biodiversification Event, commonly referred to as the GOBE. The GOBE is characterized by a series of rapid increases in the diversity of marine fauna during the Ordovician. A compilation of growth habit data based on the general morphology of the bryozoans and brachiopods of the region is compared to the morphological disparity of early genera of brachiopods and later genera of bryozoans in order to document the pattern of occupation of a hypothetical morpho-eco space. An analysis of the growth habits of bryozoans and brachiopod shell forms from the Benbolt Formation provides important regional data to support the biodiversification event that occurred in the region. The data collected from the Benbolt Formation is restricted given the environmental and regional setting, but the rich fauna contributes to global data. Disparity data collected on the Benbolt Formation and equivalents can be expanded in both space and time through the analysis of additional Great Ordovician Biodiversification Event fauna. Studying the morphological differences of fossil invertebrates within the Appalachian region during the Middle Ordovician has potential to contribute to our understanding of the global implications of the GOBE and its legacy for the subsequent life on Earth.

GOVERNMENT AND JUSTICE STUDIES

Erin Bishop, Political Science, Graduate

AN ANALYSIS OF SOUTHERN APPALACHIAN FAMILY FOREST OWNER VALUES AND DERIVED BENEFITS IN RELATION TO CARBON OFFSET MECHANISMS

Faculty Mentor: Tatyana Ruseva, Arts and Sciences

Coauthor(s): Tatyana Ruseva

As it stands, family forestland presents an important and untapped potential in climate mitigation initiatives. According to Caputo and Butler (2017), 86% of family forest owners would like their woodlot to stay wooded, but only 2% have collected money for carbon storage. Managing for carbon alongside other forest ecosystem goods and services on family forest lands does not necessarily align with traditional notions of forest management (Clay et al. 2017). Prioritizing management strategies for the provision of a bundle of forest benefits involves the recognition of diverse owner/user preferences (e.g. objectives, values, social demographics) and the importance of context (time, place, biophysical conditions, land tenure, markets and policies). This can present tradeoffs pertaining to timber use/extraction, recreation, and carbon storage in relation to present day decision-making and future planning. Through a series of interviews with forest owners in rural Appalachia, we identify (1) what forest benefits are most important to rural forest owners; 2) how these benefits are valued over time; and 3) how they may relate to forest carbon and the mechanisms for participating in forest carbon offset projects. Results contribute to an understanding of carbon storage baselines and an increased potential for carbon storage on rural family forestlands, where the baseline is a complex function of human preferences, trade-offs, and land-use trajectories over time.

Enzo Codella, Psychology, Undergraduate

ALL BY MYSELF: MALADAPTIVE BEHAVIORS AND PSYCHOPATHOLOGIES ASSOCIATED WITH SOLITARY CONFINEMENT

Faculty Mentor: Barbara Zaitzow, Arts and Sciences

Solitary confinement, as a technique for prison management, has been utilized in the United States since the 1800s. Today, an estimated 80,000 to 100,000 people are isolated in cells for 23 hours a day for weeks, months or even years (Sentencing Project, 2017). Justifications for the use of solitary confinement range from incapacitating incorrigible individuals to protecting vulnerable individuals from the mainstream prison environment (DeMarco, 2012). These rationales, however, are questionable in light of the empirical evidence on the effects of isolation on humans such as: (1)high risk for emotional disturbances and breakdowns, (2)stress-related reactions, (3)crippling levels of anxiety and panic, (4)memory and attention problems, and (5)suicide among other symptoms and conditions. The purpose of this paper is to explore the use of solitary confinement in America's prisons and to discuss the utility of solitary confinement in light of the potential damage done to inmates' psyches which can exacerbate maladaptive reactions and psychopathology as well as interfere with reintegration efforts.

Seth Fraser, Criminal Justice, Undergraduate

MODERN TRENDS IN RIOTS AND PROTESTS

Faculty Mentor: Tammatha Clodfelter, Arts and Sciences

Protests and riots have recurred frequently throughout American history. While these events were typically expressions of major dissatisfaction by marginalized and minority populations in decades past, the demographic and purpose of riots and protests have changed greatly. This project intends to understand and explain the key difference between riots and protests, from social, political, and historical perspectives. Police responses to protests and riots are examined, including "less than lethal" weapons such as pepper spray and tasers, and controversial crowd control techniques such as "kettling.' Finally, modern trends in protests and riots will be discussed, specifically the radically different demographic of rioters, new methods of rioting, and new issues voiced in protests. Multiple peer-reviewed and reputable sources are examined to form a comprehensive picture of the issues examined. Studies in the sciences of social action and interaction are examined to understand different methods and classification of riots and protests. First hand, well-sourced research on methods and technology of protest policing is utilized to understand law enforcement responses to these issues. Finally, both firsthand and scholarly sources have been examined to explain events of protest and riots in both modern and historical settings.

Shaina Katz, Political Science, Undergraduate

JORDAN WITHIN THE SHIFTING BALANCE OF MIDDLE EAST POLITICS

Faculty Mentor: Cary Fraser, Arts and Sciences

The period between 1967-1973 was trans formative for the governments of the Middle East. King Hussein and the leadership in Jordan faced many challenges on both the domestic and international fronts. This case study attempts to discover ultimately how the Hashemite kingdom dealt with the pressures from military defeats, loss of territory, threats from religious fundamentalism, Marxist-Nationalist uprisings, continued tensions with Israel, and Cold War politics. This study will explore how the regime's survival and success compares with many of their neighbors who crumbled from similar external and internal pressures. Jordan's choices in the face of these challenges did not result in the bloody coups that overthrew previous 'colonial regimes' in the region. This study will examine how instead of falling victim to increasing pressures from all sides, Jordan used these internal and external challenges to propel themselves forward to become a stabilizing and moderate force in the region. The decisions made in those challenging times by King Hussein's government will be explored to better understand how moderation can succeed against the ever challenging forces of radicalism and reaction.

Emma Labovitz, Global Studies, Undergraduate

RHETORIC VS. REALITY: REFUGEES IN SWEDEN AND ITS POLITICAL CONSEQUENCES IN THE U.S.

Faculty Mentor: Renee Scherlen, Arts and Sciences

This research project seeks to gain a better understanding on the effect of the recent increase of refugees into Sweden, how the U.S. media has depicted these events, and if there are any implications for this on U.S. policy. As Sweden has taken in the largest per capita number of refugees in Europe, some U.S. media outlets praised, while others vilified Sweden for their actions. To understand what actually happened in Sweden outside the lens of U.S. media, this paper includes a qualitative analysis conducted in Sweden during January of 2018 to assess the current public opinion about refugees there. The Consensual Qualitative Research model guided the methodology, collection of data, and subsequent analyses. The results of the semi-structured interviews were compared to U.S. news sources to see how accurately the U.S. media depicted the events in Sweden. The rhetoric of the U.S. newspapers was understood through a word frequency count based on articles from the last four years. The word frequency provided insight into how the media framed the issue, and, in turn, how this frame affects U.S. policy. The results have shown that coverage of immigration in Sweden lacks both depth and consistency to strongly impact policy, but the alarmist nature of U.S. media can adversely affect immigration policy as politicians have, and can, use this negative coverage to validate their stance on immigration to the U.S.

HEALTH AND EXERCISE SCIENCE

Peyton Attaway, Public Health, Undergraduate

EFFECTS OF ADVERSE CHILDHOOD EXPERIENCES ON ALCOHOL ABUSE IN ADULTHOOD

Faculty Mentor: Erin Bouldin, Health Sciences

Coauthor(s): Hege A, Bouldin ED

Background: Studies have shown that adverse childhood experiences (ACEs) have been associated with several negative adult health outcomes including alcohol abuse. The impact that ACEs have on alcohol abuse may vary between adults living in the Appalachian region of North Carolina and those who do not. This study aims to understand the relationship between the categories of ACEs and alcohol abuse as well as the geographic differences between them. Methods: Data from North Carolina's 2012 and 2014 Behavioral Risk Factor Surveillance System (BRFSS) was utilized. Respondents to the BRFSS were classified as living within or outside of Appalachia based on the Appalachian Regional Commission's definition. Respondents who reported experiencing any of 11 ACEs in their childhood were then further classified into one of the three subtypes of ACEs - household dysfunction, physical/emotional abuse, and sexual abuse. Respondents who answered the four questions on the BRFSS regarding alcohol use were used. Conclusions: Adults who experienced physical and emotional abuse as a child were more likely to be considered heavy drinkers in both geographical areas. Adults in Appalachia who experienced physical and emotional abuse were more likely to be binge drinkers, while adults outside of Appalachia who experienced either physical and emotional abuse or household dysfunction were more likely to be classified as binge drinkers.

Margaret Bennett, Public Health, Undergraduate

ADVERSE CHILDHOOD EXPERIENCES AND FOOD INSECURITY IN APPALACHIA

Faculty Mentor: Adam Hege, Health Sciences

Coauthor(s): Erin Bouldin, Adam Hege

Research has highlighted numerous health disparities across the Appalachian region of the United States. Many of these disparities are rooted in the social determinants of health, one of which is food insecurity. Previous studies have found that adverse childhood experiences (ACEs) are related to lower socioeconomic status and poorer health in adulthood but none has explored the link with food insecurity using a population-based sample. In this study, we focused on 28 counties in western North Carolina (NC) that are located in the Appalachia region and compared them with the rest of the state. We used data on adults from NC's 2012 Behavioral Risk Factor Surveillance System. Respondents reported if they experienced any of 11 ACEs; we classified them as experiencing 0-3 ACEs or 4+ ACEs, consistent with previous research. Respondents also reported how often they worried/stressed about having enough money to buy nutritious foods within the past 12 months; if they were always, usually, or sometimes worried/stressed we classified them as being food insecure. Among 1,934 respondents in Appalachia, 23% of people with 0-3 ACEs experienced food insecurity compared to 46% of people with 4 or more ACEs. This association persisted after adjusting for age and sex. People in Appalachia were more likely to experience food insecurity than people outside Appalachia. ACEs contribute to food insecurity in adulthood, including among people in Appalachia who are already at elevated risk.

Megan Campany, Exercise Science, Undergraduate

INVESTIGATION OF SEX DIFFERENCES BETWEEN NOKIA BODY CARDIO AND SPHYGMOCOR APPLANATION TECHNOLOGY

Faculty Mentor: Scott Collier, Health Sciences

Coauthor(s): A. Lubkemann, C. McCraw, P. St.Clair, SR Collier

There is an emerging technology revolution to monitor fitness and health with mobile health monitors. The Nokia Health platform includes the Body Cardio scale with the goal of early recognition of increased pulse transit times, detected via a proprietary algorithm, yet males and females differ in regional distribution of body mass. No device has been tested against laboratory gold standards and sex differences have never been elucidated. The purpose of our study was to validate the Body Cardio scale for accurate analysis of PWV compared to a laboratory gold standard (SphygmoCor, AtCor Medical). We hypothesized that the mobile version would give greater variability, lending to increased error. METHODS: 20 normotensive, college-aged individuals (10 male, 10 female; mean 20 ± 1.1 years) utilized the Body Cardio scale in a laboratory setting to obtain PWV measurements, followed by standing PWV measurements with the SphygmoCor. An rmNOVA was employed for all dependent variables. RESULTS: Male pulse wave velocity was 6.3 ± 0.179 and 6.9 ± 0.244 (m/s) and female was 5.9 ± 0.179 and 6.6 ± 0.244 (m/s) with Body Cardio and SphygmoCor technologies respectively. Nokia underestimated PWV in males by 0.703 and 0.653 in females; this is a statistically insignificant value. CONCLUSION: The ability of the Nokia Body Cardio to accurately measure PWV at home for both sexes lends great healthcare significance and can lead to a wider scope of information for an individual's physician.

Anna Ruth Carmichael, Exercise Science, Undergraduate

SEX DIFFERENCES IN OXIDATIVE STRESS: IMPLICATIONS ON VASCULAR FUNCTION

Faculty Mentor: Rebecca Kappus, Health Sciences

Coauthor(s): Jessica Yomano, Lauren Dunn, Caroline Blackman, Rebecca Kappus

INTRODUCTION: Cardiovascular (CV) disease is the leading cause of death in women in the United States, however, is not manifested until post-menopause, indicating a role of estrogen in CV protection. Oxidative stress (OS) is a contributing factor in diseases such as hypertension and atherosclerosis through decrements in nitric oxide (NO). Because estrogen has been shown to release NO, this estrogen loss and subsequent OS environment could be a contributing factor in the elevated CV risk seen in post-menopausal females. PURPOSE: To determine if males and females respond differently to elevations (oxygen supplementation) and decrements (antioxidants) in OS. METHODS: Thirteen males and females (18 – 25 years) received antioxidant (AOX) or oxygen (OXY) supplementation in a randomized, cross-over design. Blood pressures (aortic, carotid, and brachial) and arterial function measures were compared between conditions (baseline, AOX, OXY) using a 3-way ANOVA and followed up with appropriate t-tests when significant. RESULTS: Males displayed a decrease in arterial compliance with OXY. Females displayed decreases in both central (aortic and carotid) and peripheral (brachial) blood pressures with AOX. This suggests males are more susceptible to an oxidative stressor and females are more responsive to decreased oxidative stress.

Amber L. Daniel, Exercise Science, Undergraduate

STUDENT ATHLETES AND MENTAL HEALTH: AN EXPLORATION OF POTENTIAL HURDLES TO STUDENT SUCCESS

Faculty Mentor: Alex F. Howard, Health Sciences

Coauthor(s): Alex F. Howard

Purpose: The purpose of this study was to determine the prevalence of mental illness in student athletes and their help seeking behaviors. This study served to expand upon the current research on student athletes and mental illness in order to improve the support provided to this special student population. Methodology: In the fall semester of 2017, a campus-wide health assessment was administered via email at a mid-size university in the South-East region of the U.S. The survey included 63 items, capturing demographics and history of mental health challenges. Students were asked about the occurrence of: overwhelming anxiety; depression; and suicidality, within the last 12 months. Students that provided a positive response to either of these items was then asked about their mental health help seeking behavior. Analyses include simple descriptive statistics as well as rate ratios. Results: More than 1,800 students participated in the assessment, of which 118 were student athletes. Among student athletes that participated, 78 identified as women, 31 identified as non-white, and 93 were age 17-20. Student athletes were found to have significantly lower rates of depression, yet slightly higher rates of suicidality. Mental health help seeking was also 38% lower among student athletes when compared to non-student athletes. Conclusions: This study supports previous findings that student athletes have comparable rates of mental illness and seek help less than non-athlete peers.

Jena Donovan, Athletic Training, Undergraduate

VESTIBULAR REHABILITATION IN CONCUSSION RTP PROTOCOLS

Faculty Mentor: Alan Needle, Health Sciences

Coauthor(s): Caroline Sawyer, Alan Needle.

Increases in concussion research has raised awareness regarding long-term effects and prevention of these pathologies; however, little is known regarding treatment options. Vestibular therapy addresses balance and coordination-related changes after concussion, and may improve recovery time after these injuries. We therefore aimed to review the literature and determine if vestibular rehabilitation compared to gradual return-to-activity decreased post-concussive symptoms in athletes. CINAHL and PubMed were systematically searched for relevant terms, allowing us to identify 7 studies that evaluated the efficacy of vestibular rehabilitation in concussed individuals. After identifying the articles, a critical appraisal was completed in three main categories: applicability, quality and statistical quality. All seven studies supported the use of vestibular therapy as an effective treatment option when trying to decrease concussion symptoms. The quality assessment revealed major threats to the studies' internal validity, with regards to randomization and blinding of subjects and assessors. Evaluation of the statistical quality showed that while articles reported statistical significance, measures of clinical significance were not often provided. Overall, although evidence suggests this treatment is effective, further research would need to employ better experimental control and populations specific to sport-related concussion to draw a definitive conclusion.

Kathryn Farina, Exercise Science, Graduate

DOES FOOT STRIKE PATTERN CHANGE DURING A MAXIMAL 800-METER RUN?

Faculty Mentor: Herman van Werkhoven, Health Sciences

Coauthor(s): Mark H. Langley, Marco Meucci, Alan R. Needle, Natalie R. Kile, Herman van Werkhoven

Foot-strike patterns (FSP) are associated with improved running economy and injury-risk biomechanics across distance runs. While forefoot (FF) running is more prevalent in sprinting, it is unclear how the high intensity of mid-distance running in an 800-m run influences FSP. We therefore aimed to determine how FSP change across 100-m intervals of an 800-m run. We hypothesized there would be a change from a more FF strike to a more rearfoot (RF) strike throughout the run. 21 subjects (14 female, 7 male; age: 24.29±4.54 yrs) participated in a maximal 800-m run while foot strike was assessed using inertial measurement units (BiostampRC, mc10, Lexington, MA, USA). Foot strike angular velocity (ωFS-ave) and change in foot strike angle (Δθave) were used to evaluate foot strike changes. Each foot strike was averaged across the four 100-m straight intervals of the 800-m. One-way repeated measure analyses of variance (ANOVA) were used to (1) analyze time across the 100-m straight intervals of the 800-m run and (2) investigate the factor of distance on i) ωFS-ave and ii) Δθave over each 100-m interval. The first straight was run significantly faster than the other three straights ($F[3,60] = 15.982$, $p<0.001$). There were no significant changes observed for ωFS-ave ($F[3, 60] = 0.880$, $p=0.457$) or Δθave ($F[3, 60] = 2.683$, $p=0.055$) over each 100-m interval. Contrary to our hypothesis, runners did not move from a FF strike to a RF strike during the straight sections of the 800-m run.

Mary Clare Gabel, Public Health, Undergraduate

READABILITY OF ONLINE EDUCATIONAL PRE-ECLAMPSIA MATERIAL

Faculty Mentor: Christopher Seitz, Health Sciences

Coauthor(s): Christopher Seitz

Background: Experts recommend that educational health material be written at a 4th-6th grade reading level. Pre-eclampsia is a health condition associated with maternal mortality. There are online educational materials that inform patients about this condition; however, the reading level of these materials have yet to be analyzed. This study analyzed the reading levels of popular websites that patients may us to lean about pre-eclampsia. Methods: The term "pre-eclampsia" was used in an internet search engine to collect a sample of the first 40 websites operated by health-related organizations. To determine reading levels of each website, the SMOG reading formula was used, which is a process of tallying the number of polysyllable words from a sample of 30-sentences from a text. Then, a conversation chart was used to determine the approximate reading level based from the tally of polysyllable words. Findings: Of the 40 websites in the study, none had information at the 4th-6th grade reading level. The material ranged in reading level from the 7th grade to graduate school level, with a mean of the 11th grade reading level. Discussion: Online pre-eclampsia materials need to be modified to be accessible to the general public. The government provides several free guides to help public health professionals simplify polysyllable words to make sure materials are written at the recommended reading levels.

Charleston Gaillard, Interdisciplinary Studies, Undergraduate

EXERCISE CHARACTERISTICS IN MANGANESE SUPEROXIDE DISMUTASE OVEREXPRESSING MICE

Faculty Mentor: Kevin Zwetsloot, Health Sciences

Coauthor(s): Shriya Rao, Benjamin Klatt, Alexander McKinley, Andrew Shanely, Brooke Christian, and Kevin Zwetsloot

Oxidative stress can result from prolonged, high intensity exercise and may lead to skeletal muscle fatigue and decreased exercise performance. Manganese superoxide dismutase (MnSOD), an endogenous mitochondrial antioxidant enzyme, defends against oxidative stress caused by superoxide. Skeletal muscle function in transgenic mice overexpressing MnSOD has not been characterized. The objective of this study was to investigate if exercise capacity differs between transgenic mice that overexpress MnSOD in the mitochondrial matrix (SOD2) and their wild-type (WT) littermates. Female 8-10 mo old SOD2 and WT mice performed 3 consecutive forelimb grip strength tests with 1-min rest between trials. Next, mice performed a maximal exercise capacity test, which consisted of a 10-min warm up at 10-12.5 m • min-1 and 5-10° incline, followed by 2-min stages of increasing treadmill speed by 3 m • min-1 every stage; treadmill remained at 10° incline and mice ran to exhaustion. 48 hours after the completion of the maximal exercise capacity test all mice performed an exercise endurance test consisting of a 10-min warm up at 10-12.5 m • min-1 and 5-10° incline followed by a run to exhaustion at a constant treadmill speed of 22 m • min-1 and incline of 10°. Grip strength, maximal exercise capacity and exercise endurance were not different between SOD2 and WT mice ($p>0.05$, all). These findings suggest that overexpression of SOD2 does not alter grip strength, treadmill exercise capacity or endurance in mice.

Joshua Godwin, Exercise Science, Graduate

RECOVERY FROM IN VIVO ECCENTRIC SKELETAL MUSCLE DAMAGE: OLD VERSUS YOUNG

Faculty Mentor: Andrew Shanely, Health Sciences

Coauthor(s): Charles F. Hodgman, Tyler T. Rice, Kevin A. Zwetsloot, R. Andrew Shanely

We previously reported depressed contractile function in old compared to young skeletal muscle. The purpose was to compare the recovery of old versus young skeletal muscle 7-days after in vivo eccentric muscle damage. Old male mice (27.0 mo) (O) and young male mice (5.6 mo) (Y) were anesthetized and in vivo isometric contractions were performed for optimal electrode placement and to determine the pre-injury torque-frequency (TF) relationship (PRE). 150 eccentric contractions were elicited to induce injury. The TF was re-measured immediately post-injury to confirm damage. After 7-days recovery, mice were anesthetized and the TF was measured again. Repeated measures ANOVA showed a significant time by group interaction ($p=0.035$), with no difference between groups in the TF pre-injury ($p=0.231$) and a between group difference in the TF 7-days post-injury ($p<0.001$). Further analysis revealed that the TF recovered to a greater degree in Y ($p=0.313$) than O ($p=0.003$). Analysis of a submaximal torque (40 hz) indicated Y recovered 77% of initial isometric torque (IT) ($p=0.254$), while O only recovered 48% of initial IT ($p=0.003$) after 7 days. Analysis of maximal tetanic torque (250 hz) indicated neither Y nor O recovered to pre-injury torque, 46% ($p<0.001$) and 67% of initial ($p=0.003$), respectively). IT decrements persist in young and old male mice after 7-days of recovery from EC. These data suggest old mice exhibit a diminished capacity to recover IT following eccentric damage.

Taylor Goodman, Exercise Science, Graduate

THE EFFECTS OF ANXIETY ON PSYCHOBIOLOGICAL INDICATORS OF PHYSIOLOGICAL STRESS

Faculty Mentor: Abigail Stickford, Health Sciences

Coauthor(s): Danna Rodriguez, Abigail Stickford

Importantly, high anxiety is associated with elevated blood pressure and cardiovascular disease later in life. The reasons for this increased risk are not completely understood, but may involve changes in how the central nervous system controls blood pressure and blood vessels. These sympathetic neural changes may be present even before any clinical manifestations of cardiovascular disease (e.g., elevated blood pressure (BP)) are observed. Thus, the primary objective of this study is to examine psychological and physiological measures of stress (for example, blood pressure, heart rate, and sympathetic nervous system activity) at rest and during exercise in anxious vs. non-anxious, healthy college-aged students. During each session, muscle sympathetic nerve activity (MSNA), heart rate (HR), and BP will be measured in subjects performing activities to simulate different types of physiological stress, including a cold-pressor test (pain), a dynamic hand grip test (exercise), and a head-up tilt test (orthostatic challenge). The expected results of this research are that highly anxious young adults will display greater cardiovascular reactivity (i.e, greater increases in MSNA, HR, BP) in response to the various physiological stressors. The results of this study will help us to understand the cardiopulmonary limitations and symptoms of anxiety in order to design and implement effective exercise interventions in the future.

Charlie Hodgman, Exercise Science, Graduate

PHYTOECDYSTEROIDS ENHANCE SKELETAL MUSCLE FUNCTION RECOVERY FOLLOWING IN VIVO ECCENTRIC CONTRACTION INDUCED INJURY IN OLD MICE

Faculty Mentor: Kevin Zwetsloot, Health Sciences

Coauthor(s): Joshua S. Godwin, Kevin A Zwetsloot, R. Andrew Shanely

Previously, our group demonstrated that 20-ecdysterone (20E) increased skeletal muscle protein synthesis and fiber size in old mice; however, the effect of 20E on recovery from eccentric contraction (EC) induced damage is unknown. To investigate if 7 days of 20E supplementation improves recovery of skeletal muscle function following EC, compared to placebo (PLA), old male mice (age 27.5+/-0.5 mo) were assigned to either EC+20E or EC+PLA groups. Mice were anesthetized and Isometric contractions were elicited to obtain a torque-frequency (TF) relationship (PRE). 150 EC were then performed to induce injury in the anterior crural muscle group. At completion, the TF relationship was re-measured (POST). Upon recovery from anesthesia, mice received either 20E (50 mg*kg-1 BW) or PLA (saline) by oral gavage. Mice were given 20E or PLA daily for 7 total days. On day 8, the TF relationship was re-measured (7-day) to assess recovery of muscle function. Repeated measures ANOVA showed that EC in EC+PLA led to a depression in the TF relationship ($p<0.01$) at 7-day, whereas 7 days of 20E supplementation led to recovery of the TF relationship to PRE ($p=0.461$). Additionally, maximal (250 Hz) and submaximal (40 Hz) isometric torques remained depressed in EC+PLA ($p=0.014$ and $p=0.004$, respectively), while EC+20E showed no change ($p=0.559$, $p=0.632$, respectively) from PRE to 7-day. These findings suggest that 20E exerts beneficial effects to aid in the recovery of skeletal muscle function following EC induced injury.

William Johnson, Chemistry, Undergraduate

INFLUENCE OF 20-HYDROXYECDYSONE ON SKELETAL MUSCLE MONOCYTE INFILTRATION FOLLOWING ECCENTRIC DAMAGE

Faculty Mentor: Kevin Zwetsloot, Health Sciences

Coauthor(s): Kevin Goslen , Kevin Zwetsloot

Inflammation plays an important role in the skeletal muscle repair process after damage. In addition to exerting anabolic/growth effects on skeletal muscle, phytoecdysteroids, like 20-hydroxyecdysone (20E), have been reported to possess anti-inflammatory properties. Little is known about how phytoecdysteroids may affect the muscle repair process after damage. The purpose of this study was to investigate the influence of 20E on the inflammatory response in mouse skeletal muscle following eccentric damage (an acute bout of injurious downhill running; DHR). Male mice (3-6 months of age) were randomly assigned to either DHR or No DHR groups, with or without 20E supplementation. Mice were given 20E or placebo (PLA) treatment immediately after DHR and every day until sacrifice. Skeletal muscles were harvested two days and five days following DHR. Muscle samples were cryosectioned, then using light microscopy and immunofluorescence histochemical techniques, the general tissue morphology and neutrophil and macrophage infiltration were examined, respectively. There was no significant difference in downhill running time between PLA and 20E groups (65.8 + 15.5 vs. 59.3 + 7.6 minutes, respectively; p=0.255). Furthermore, our preliminary results suggest that phytoecdysteroid supplementation does not alter tissue morphology or monocyte infiltration, compared to placebo, after an acute bout of injurious downhill running in mouse skeletal muscle.

Vanna Labi, Public Health, Undergraduate

TIME SPENT OUTDOORS, PHYSICAL ACTIVITY AND MENTAL HEALTH STATUS AMONG COLLEGE STUDENTS: BASELINE DATA FROM THE STUDENT PARK AMBASSADOR PILOT STUDY

Faculty Mentor: Richard Christiana, Health Sciences

Coauthor(s): Richard W. Christiana, Rebecca A. Battista, J. Joy James, Rebecca K. Hess

Spending time outdoors and outdoor physical activity (OPA) has been shown to have various benefits to mental health for young adults. College students often overlook OPA as a means to decrease symptoms of depression and stress that result from the demands of academic life. The purpose of this study is to evaluate baseline data collected from a Student Park Ambassador pilot study which utilizes peer counseling to promote OPA. Students in introductory level courses at Appalachian State University completed an online survey that assessed participants' demographic characteristics, time spent in the outdoors, OPA, and mental health status. Sixteen students completed the survey. Half reported frequent time spent outdoors in a typical week with 30.3% spending <1 hour outdoors on a typical week day. Only 25.0% reported participating in frequent OPA in a typical week. In the past month, 62.5% of participants reported frequently feeling "nervous", 75.0% feeling "restless or fidgety", 12.5% feeling "so depressed that nothing could cheer them up", 37.5% feeling "everything was an effort", and 12.5% feeling "worthless." Overall, given the relatively high rate of negative mental health symptoms among college students, there is much room for improvement in students' time spent in the outdoors and OPA to improve mental health. It will be important to develop interventions for college students to change their subjective views of the benefits of spending time spent outdoors and OPA.

Erica Larson, Exercise Science, Graduate

EXERCISE PERFORMANCE AND PERCEPTION OF BREATHLESSNESS AFTER CAFFEINE INGESTION IN TRAINED CYCLISTS

Faculty Mentor: Andrew Shanely, Health Sciences

Coauthor(s): Jayvaughn Oliver, Jonathon Stickford, Kimberly Fasczewski, R. Andrew Shanely

Caffeine (CAF) is commonly ingested as an ergogenic aid among cyclists, in part, due to its effect on pain perception. CAF also may improve exercise performance by altering the perceptions related to dyspnea. The purpose of this study was to compare exercise performance and the rating of perceived breathlessness (RPB) after ingestion of a moderate dose of CAF or placebo (PLA) in trained cyclists. Eight male cyclists completed pulmonary function testing and a peak aerobic capacity test (VO2peak: 60.8±5.7 ml·kg-1·min-1). During visit two, cyclists completed a fixed-work familiarization time trial (TT) equivalent to a distance of 20km. Subsequently, and on separate days, subjects completed in a randomized, counterbalanced order, TTs with ingestion of a placebo (TTPLA) or caffeine (TTCAF; 5 mg·kg-1). Elapsed time, ventilatory dynamics, and perceptual responses were measured every 10% interval during each TT. Elapsed time was significantly reduced during TTCAF compared with TTPLA trials (33.5±2.8 vs. 35.5±2.7 min, p<0.01). RPB and ventilation did not differ at any interval between TTCAF and TTPLA trials. Exercise performance improved after caffeine ingestion. However, ventilation is a parameter known to elevate RPB.

Austin Lubkemann, Exercise Science, Undergraduate

VALIDITY OF NOKIA PULSE WAVE VELOCITY SCALE VERSUS GOLD STANDARD APPLANATION TONOMETRY IN A YOUNG HEALTHY POPULATION

Faculty Mentor: Scott Collier, Health Sciences

Coauthor(s): Megan Campany, Connor McCraw, Price St. Clair, Scott R Collier

Pulse Wave Velocity (PWV) is considered a gold standard for measuring arterial health in adults. Deleterious changes in arterial compliance have been shown to be an early risk factor of cardiopulmonary disease. The Nokia Body Cardio Scale has been marketed its ability to measure PWV in the home, however there is no data to show if it is an accurate measure. PURPOSE The aim of our study was to determine the accuracy and reproducibility of the PWV feature of the Nokia Body Cardio in comparison to the gold standard in applanation tonometry (SphygmoCor, AtCor Medical). We hypothesized that the differences between the two measurements would not be significantly different. METHODS 20 (10 male, 10 female) normotensive healthy young adults (20 years +/-1.1 years) enrolled in this study. PWV measurements with SphygmoCor were utilized to maintain ecological validity with the scale. Three measurements with each operating system were obtained over a period of sixty minutes for each individual (counterbalanced). All data expressed as mean ± SE. RESULTS No significant differences were found between measurements with SphygmoCor or Nokia Body Cardio systems were detected. (PWVSphyg= 6.1 ± 0.1 vs. PWVNokia= 6.8 ± 0.2 m/s). CONCLUSION There were no statistical differences detected between devices, suggesting the home-based system of tracking PWV using the Nokia Body Cardio can be highly accurate. Monitoring cardiopulmonary health at home can be useful in providing clinical insight for longitudinal healthcare monitoring.

John Mackall, Exercise Science, Graduate

THE EFFECTS OF ECCENTRIC MUSCLE DAMAGE ON NEURAL INHIBITION

Faculty Mentor: Alan Needle, Health Sciences

Coauthor(s): Herman Van Werkhoven, Edward Merritt, Alan Needle

Eccentric exercise incorporating lengthening muscle contractions are commonly used in strength training. This type of exercise contributes to micro-tearing of muscle leading to soreness, inflammation, and sensations of muscle stiffness. These symptoms are known to modify reflex loops and cortical inhibition among populations with acute and chronic joint injuries, affecting the ability to appropriately recruit muscle. We aimed to determine if exercise-induced muscle damage (EIMD) modified reflexive and cortical inhibition to the calf muscles. Twelve healthy subjects completed an eccentric muscle damage protocol of the calf muscles. Reflex inhibition was assessed using the Hoffman reflex at the sciatic nerve, and cortical inhibition was assessed using the silent period quantified through transcranial magnetic stimulation before, immediately after, and 24 and 72 hours after EIMD. The EIMD protocol consisted of 10 sets of 10 eccentric calf contractions on a dynamometer at 75 percent maximal force. Changes across times were assessed using analyses of variance. Results indicated that despite increases in soreness after EIMD ($F_{3,27}=5.124$, $p=0.006$), no changes were observed for soleus or gastrocnemius reflexive inhibition ($F_{6,48}=0.822$ $p=0.558$) or silent period ($F_{3,15}=0.696$, $p=0.569$). These findings suggest that EIMD does not modify neural inhibition as observed in joint damage studies, indicating that eccentric exercise does not impede the nervous system's ability to recruit muscle.

Wilton Norris, Exercise Science, Graduate

ABSTRACT: PQCT AS AN ALTERNATIVE TO MRI TO QUANTIFY 3D BONE GEOMETRY – A FEASIBILITY STUDY

Faculty Mentor: Herman van Werkhoven, Health Sciences

Coauthor(s): Herman van Werkhoven, Hannah Clark

Purpose: This study investigates the feasibility of Peripheral Quantitative Computed Tomography (pQCT) as a measure of 3-dimensional (3D) bone geometry. Magnetic Resonance Imaging (MRI) has been commonly used to determine bone geometry. Though absent of radiation, MRI is costly and requires highly trained personnel. Also, typical lower extremity scans take 20-35 minutes. pQCT offers a cheaper, less invasive approach and exposes a subject to radiation (with dosage levels at a fraction of regular x-ray). Methods: Two samples of irregular bones (T8 vertebra; talus - synthetic bone models) were scanned using a STRATEC XCT 3000 pQCT scanner. Three protocols were completed using different numbers of cross-sectional images (slices): 5; 10; 20. Results from the scans were compared with respect to scan times (ST), radiation levels (RL) and scan quality (SQ). Scanned slices will serve as input to image processing software (ImageJ) to create a 3D model of bone structure. Results and Discussion: Preliminary results indicates ST range from 6-21 minutes and RL range from 2.76-7.02 mSv for the respective different number of scans (5-20 scans). All results were well within MRI scan time ranges and radiation levels were estimated lower than a single x-ray. Initial SQ results suggest that bone model quality could be comparable to those of MRI, indicating that pQCT can be a viable option for measuring bone geometry. Future research will investigate pQCT use for foot bone geometry analysis.

Victoria Nothnagel, Athletic Training, Undergraduate

IN COLLEGIATE ATHLETES POST ACL SURGERY, HOW DOES ELECTRICAL STIMULATION WITH REHABILITATION COMPARED TO REHABILITATION ALONE AFFECT STRENGTH?

Faculty Mentor: Alan Needle, Health Sciences

Coauthor(s): Kevin Jones, Alan Needle, Jennifer Howard

Anterior cruciate ligament reconstruction (ACLR) is a common surgery done among athletic populations, and is often necessary to continue a physically active lifestyle. A common problem following ACLR is atrophy of the quadriceps muscle due to arthrogenic muscle inhibition, leading to inactivation of the muscle and subsequent losses in strength. Because of the neuromuscular nature of these deficits, rehabilitative exercise is often not sufficient to restore quadriceps strength, and modalities such as electrical stimulation are used to improve muscle activation. We aimed to review the literature and determine if electrical stimulation with rehabilitation contributed to improvements in strength after ACLR. Articles surrounding this topic were found through three databases: PubMed, CINAHL, and SPORTDiscus and were appraised for applicability, quality, and statistical quality. Four of the five articles appraised found electrical stimulation to aid in the strength of patients following ACLR. The one article that found electrical stimulation to be of no use occurred during a time when the standard of care included prolonged immobilization, and may have negatively impacted the results. All articles employed strong methodological quality and had adequate reporting of statistical and clinical significance. We therefore concluded that the use of electrical stimulation is an effective intervention for aiding in the recovery of quadriceps muscle strength in patients post-ACLR.

Jayvaughn Oliver, Exercise Science, Graduate

EXERTIONAL DYSPNEA IN YOUNG ADULTS

Faculty Mentor: Jonathon Stickford, Health Sciences

Coauthor(s): Jonathon Stickford

Introduction: The underlying mechanisms of exertional dyspnea in otherwise healthy individuals are not completely understood. Purpose: The purpose of this study is to examine factors related to dyspnea during exercise in college-aged students. Methods: During the initial visit, participants completed standardized body composition, pulmonary function, and maximal aerobic capacity ($\dot{V}O_2max$) exercise tests. During the second visit, participants completed three, 6-min constant work rate cycling trials at 50% $\dot{V}O_2max$. Each trial was separated by 15-20 minutes of passive recovery. During two of the cycling trials, additional ventilatory dead space or resistors were placed in the inspiratory and expiratory lines. Ratings of perceived breathlessness (RPB) and unpleasantness of breathlessness (RPU) were examined during the cycling trials. Results: Two participants (one female) completed all testing procedures. As compared with control, the additional ventilatory dead space increased RPB and RPU by 2.0±0.0 and 2.5±0.7 AU, respectively. Despite requiring greater pressure generation, resistors less severely increased RPB and RPU above control (1.5±0.7 and 1.3±1.1 AU, respectively). Conclusion: Exertional dyspnea in healthy individuals may be related to the chemical composition of the blood or chest wall expansion, rather than the total work required of the respiratory muscles.

Shriya Rao, Exercise Science, Undergraduate

EXERCISE CHARACTERISTICS IN MITOCHONDRIAL CATALASE OVEREXPRESSING MICE

Faculty Mentor: Kevin Zwetsloot, Health Sciences

Coauthor(s): Shriya D. Rao, Charleston E. Gaillard, Alexander J. McKinley, Benjamin T. Klatt, R. Andrew Shanely, Brooke E. Christian, and Kevin A. Zwetsloot

High intensity and prolonged exercise results in oxidative stress due to the generation of free radicals and reactive oxygen species. This negatively impacts skeletal muscle contractile function and exercise performance. Catalase, a naturally-occurring antioxidant enzyme, converts hydrogen peroxide to water and oxygen. Mitochondrial-targeted catalase transgenic (mCAT) mice have been studied within the context of disease pathology, but skeletal muscle function and exercise capacity have not been characterized. The purpose of this study was to measure grip strength, exercise capacity, and exercise endurance in mCAT mice that overexpress catalase in the mitochondria of skeletal muscle, heart, and other tissues. mCAT and wild-type (WT) littermate mice (3-8 mo old) performed a forelimb grip strength test, a maximal exercise capacity test (10-min warm up, followed by 2-min stages of increasing treadmill speed by 3 m • min-1 every stage and 10° incline) to exhaustion, and 48 hours later an exercise endurance test (constant treadmill speed of 22 m • min-1 at 10° incline) to exhaustion. No differences existed in any test between mCAT and WT mice, ($p>0.05$, all). These findings suggest that mitochondrial catalase enzyme overexpression does not alter grip strength, treadmill exercise capacity, or exercise endurance in mice.

Danna Rodriguez, Exercise Science, Undergraduate

EFFECTS OF PHYSICAL ACTIVITY ON SYMPATHETIC, CARDIOVASCULAR, AND PERCEPTUAL RESPONSES TO A PAINFUL STIMULUS

Faculty Mentor: Abigail Stickford, Health Sciences

Coauthor(s): Taylor R. Goodman, Emma K. Taylor, Abigail S.L Stickford

Purpose: The purpose of the study is to examine sympathetic neural, cardiovascular, and perceptual responses to the cold pressor test (CPT) in physically active and sedentary young women. Methods: After a pre-health screening, physically active (PA; n=4) and healthy sedentary (SED; n=2) women completed a VO2max test. Subjects returned to the laboratory for autonomic function testing, where arterial blood pressure(SBP; DBP), heart rate(HR), and muscle sympathetic nerve activity(MSNA) were continuously recorded before, during, and following a two-minute CPT. Subjects rated their pain on a scale of 1-10 immediately following the CPT. Results:PA and SED women were similar in BMI(22.7 ±1.9 vs. 23.6 ±1.1 kg/m2), and resting blood pressure(SBP:115 ±3 vs. 113 ±15 mmHg; DBP:72 ±8 vs. 75 ±7 mmHg).PA women performed more moderate-vigorous physical activity per week than SED(319 ±136 vs 0 ±0 min/week) which resulted in a higher VO2max. Resting HR(62 ± 11 vs. 76 ± 12 bpm) and MSNA(7 ± 7 vs. 17 ± 1 bursts/min) was lower in PA. During the CPT, both groups had similar increments: SBP(peak Δ = +26 ±22 vs. +41 mmHg, respectively), DBP(peak Δ = +17 ±5 vs. +22 mmHg),HR(peak Δ = +14 ±4 vs. +10 ±1 bpm),and MSNA(peak Δ = +36 ±15 vs. +28 ±8 bursts/min).SED women reported slightly higher pain ratings than PA(8.8 ±1.1 vs. 7.4 ±1.5). Conclusion:Chronic aerobic physical activity correlates to lower pain sensitivity; however, both groups displayed similar sympathetic neural and cardiovascular responses.

Hannah Snyder, Exercise Science, Graduate

INDICES OF AIRWAY FUNCTION IN IN-SEASON COLLEGIATE SWIMMERS OVER EIGHT WEEKS

Faculty Mentor: Jonathon Stickford, Health Sciences

The repeated exposure to disinfectant by-products in swimming pool environments may worsen pulmonary function and contribute to symptoms of EIB in swimmers. Fish oil supplementation, however, may exhibit protective benefits to airway function in swimmers with EIB. The purpose of this study is threefold: to assess whether or not spirometric indicators of pulmonary function change over an indoor swim season in competitive collegiate swimmers, to assess if a decrease in FEV1 in swimmers with EIB worsen over the course of a swim season and to perform a pilot investigation on the efficacy of fish-oil supplementation in swimmers with EIB over the course of a swim season. It is hypothesized that airway hyperresponsiveness will increase over the course of an indoor swim season in competitive swimmers with EIB and fish oil supplementation will attenuate airway hyperresponsiveness, as compared with placebo, in competitive swimmers with EIB. Competitive swimmers (n=13) ages 18-25 were recruited for participation in the study. Swimmers underwent pulmonary function and submaximal exercise testing (if part of the EIB portion of the study) before and after an eight-week period. Additionally, pulmonary function was assessed at 3 and 6 weeks. Data was analyzed using a one-way ANOVA in the SPSS data software. Though there were changes in FEV1 over 8 weeks, researchers observed no statistically significant changes in FVC or FEV1 over the course of an eight week swim season.

Emma Taylor, Exercise Science, Undergraduate

HEALTH BEHAVIORS AND BELIEFS AMONG PREGNANT WOMEN IN RURAL COMMUNITIES

Faculty Mentor: Abigail Stickford, Health Sciences

Coauthor(s): Abigail Stickford, Taylor Goodman

The scientific community has established that for most women, the benefits of exercise during pregnancy far outweigh any potential risks. The purpose of this study is to determine the self-reported behaviors and beliefs about physical activity, and exercise in pregnant women living in rural North Carolina. It is our objective that the findings can be utilized to develop interventional studies aimed at increasing physical activity among pregnant women, and to aid in community-based education events for local women and families. Surveys were distributed to local women's health centers in Watauga and surrounding counties. Twelve participants (20-36 years) returned partially completed surveys. Seven complete survey results indicate the following: 85.7% of women agree that light intensity exercise is safe, fewer women (71.4%) agree moderate intensity exercise is safe, while only 42.9% of women agree that vigorous intensity exercise is safe. 71.5% of participants reported that exercises involving abdominal twists are unsafe, and all respondents felt that activities involving potential for physical contact and falling are unsafe. This data contributes to the current gaps in knowledge about exercise beliefs of women in rural North Carolina, and will help us determine the best approaches, whether through education, resources, or other methods, to help improve women's health during pregnancy. Due to the current small sample size, more data is needed to make definitive conclusions.

Elizabeth Watson, Athletic Training, Undergraduate

THE EFFECTS OF MULTIPLE MODALITIES OF COGNITIVE LOAD ON DYNAMIC BALANCE IN PATIENTS WITH CHRONIC ANKLE INSTABILITY.

Faculty Mentor: Alan Needle, Health Sciences

Coauthor(s): Needle Alan R, Bearden Anna C, Doughton JHorton.

Emerging evidence suggests cognitive demand is a factor for injury recurrence among patients with chronic ankle instability (CAI); however, previous research only investigates single-modality tasks contributing to conflicting results. We aimed to determine the effect of multiple cognitive modalities on dynamic balance in individuals with CAI. Thirty-two participants (16 CAI; 16 healthy controls) were recruited to perform a series of 20 single-leg hop-to-stabilizations onto a force platform, where they were asked to balance for 15s. Five trials were each performed as subjects completed cognitive tasks including Judgment of Line Orientation (JLO), Symbol Digit Modalities (SDM), Serial Sevens (SVN) or no cognitive load (CON). The time to stabilize after the hop was analyzed across groups and conditions. Analyses of variance revealed no group effects for forward and lateral stability, but a significant difference between groups for vertical stability ($F=1.034$, $p=0.382$), where balance was worse in CAI compared to controls. Post hoc testing revealed TTS in SVN (5.584±0.110s) was greater (more unstable) than JLO (5.342±0.119s). These results indicate dynamic balance with cognitive modalities did not differentiate CAI patients from controls, although balance was worse in this population indicating different landing strategies. While differences were observed between tasks with and without visual components, it is unclear what implications this has for rehabilitation.

HISTORY

Mary Kate McCann, Global Studies, Undergraduate

THE DEBATE OVER FRENCH INTERIOR SECURITY SINCE THE 2015 TERRORIST ATTACKS: SECURITY VS. CIVIL LIBERTIES

Faculty Mentor: Michael Behrent, Arts and Sciences

After several waves of attacks and countless threats, France's interior security policy has come to combat counter-terrorism more so than any other threat to security. For most of the past three years, a state of emergency instituted after the November 2015 attacks allowed security personnel to perform surveillance, search properties suspected of terrorist activities, and investigate with minimal judicial approval. Because the threat that caused the state of emergency has not lessened, President Emmanuel Macron saw it fit to institute a permanent security policy that maintains heightened law enforcement and government powers to address security concerns with diminished civil liberties, similar to the state of emergency. I seek to answer the question: Is the perceived imposition on civil liberties worth the security that France's interior security policy provides? In so doing, I hope to provide an accurate timeline of attacks and policy adjustment in France, a comprehensive description of key actors in the policy debate, a spectrum of public opinions, an analysis of the legality and effectiveness of current policy, and an assessment of how French citizens evaluate the worth of the policy. As this conflict is developing in the present, this study will contribute a timely analysis of current and past policy as well as explain the public response and provide a history of the issue for context.

LANGUAGES, LITERATURES AND CULTURES

Courtney Roberts, French, Graduate

DÉGÉNÉRESCENCE IN FIN-DE-SIÈCLE FRANCE: A CASE STUDY

Faculty Mentor: Darci Gardner, Arts and Sciences

This project aims to explore the concept of dégénéréscence in fin-de-siècle France, investigating common explanations for this phenomenon, as understood by experts at the time and by historians more recently. Alternative explanations will then be introduced. The social unrest which can be understood as both as cause of and a result of the embrace of the idea that fin-de-siècle society was a society in decline will be put into a broader context by comparing it to other eras during which a similar brands of pessimism were exhibited. Statistics regarding crime, institutionalized populations, and other areas generally taken as indicators of the state of society and the manner in which the handling of those figures on the part of the media influences public opinion will be examined, in both the fin-de-siècle era and others. Modern knowledge of cognitive biases will then be applied to better understand the ways in which we are predisposed to certain modes of perception and how those predispositions shape our attitudes toward society. In sum, the obsession with dégénérescence and the concern it provoked in fin-de-siècle society will be revealed as only a notable manifestation of a recurring human tendency toward cynicism and fatalism, rather than a truly unique moment in history: a case study of a larger trend.

LEADERSHIP AND EDUCATIONAL STUDIES

John Leppard, Psychology, Undergraduate

MEASURING PHYSIOLOGICAL AND AFFECTIVE RESPONSES TO VIDEO GAME MODALITIES

Faculty Mentor: Paul Wallace, Education

This presentation provides an overview of a research project aimed to evaluate anxiety levels, feeling of presence, engagement, and affect in video gaming experiences. The project compares desktop, virtual reality (VR), and mixed reality (MR) gameplay. VR and MR technology provide realistic images and sounds that simulate a physical presence in an environment. As these technologies have become more affordable, they have been adopted by gaming and other industries.

The affective dimension is an important aspect of user experience design in interactive media, and the investigation of emotional responses to VR and MR environments and situations. Potentially, they could lead to the design of gaming experiences producing more engaging interaction and involvement. To that aim, this study employed integrated multimodal assessment, combining self-report and objective measures of affect and anxiety toward various gaming environments and situations. Self-report measures of emotional state evaluation were used to gauge and describe different emotions and level of stress. Physiological measures were assessed using a wearable sensor, which measured real-time indicators of anxiety and arousal, including electrodermal activity (EDA).

It is expected that participants will find VR to be more engaging, yet also more stressful, than MR and desktop game play. Preliminary results of data analysis will be presented in this presentation.

MATHEMATICAL SCIENCES

Kelly Loucks, Mathematics, Undergraduate

ANALYZING AND INFLUENCING CARBON SEQUESTRATION IN HARVESTED WOOD PRODUCTS

Faculty Mentor: Eric Marland, Arts and Sciences

Coauthor(s): Alan Arnholt, Hannah X Laws, Andrew Sullivan

WOODCARB3 expands the capabilities of the WOODCARB2 spreadsheet model by changing to an R package platform. The conversion brings increased capability for data manipulation, analysis, and reporting. It also increases the ease of integration with other datasets. This poster describes some of the results and demonstrates some of the potential for the WOODCARB3 package. Examples of the types of analysis possible include uncertainty analysis, sensitivity analysis, alternate model dynamics, and alternate pathways.

NUTRITION AND HEALTHCARE MANAGEMENT

Jessica Barnwell, Nutrition and Healthcare Management, Graduate

IMPLEMENTATION OF THE MNUTRIC SCORE IN RURAL CRITICAL CARE UNITS: A CONTINUOUS QUALITY IMPROVEMENT STUDY

Faculty Mentor: Margaret Barth, Health Sciences

Coauthor(s): Noel Barnwell, Katrina Weavil, M. Margaret Barth, Kyle L. Thompson

The purpose of this quality improvement project was to evaluate the modified NUTrition Risk in the critically ill (mNUTRIC) score's ability to predict mortality and length of stay in a community hospital in rural North Carolina. All adult patients admitted to the CCU for more than 24 hours were considered for this analysis. Patients who were missing one or more of the necessary data points were excluded from this study. mNUTRIC scores were hand calculated; scores ≥5 represented a high nutritional risk. Of the total sample, 36.7% received a mNUTRIC score of > 5. Six deaths occurred during the data collection period; all deceased patients had a mNUTRIC score of ≥5. Low mNUTRIC and high mNUTRIC score patient's had an average length of stay of 10.7 days and 17.0 days respectively. 81.8% of patients with a high mNUTRIC score were assessed by an RDN within 48 hours. Primary reason for RDN assessment in high mNUTRIC score patients was the RDN personally identified the patient at high nutritional risk. Results suggest that the mNUTRIC score is a strong predictor of mortality and length of stay for patients admitted to the facility's CCUs. Results also indicate that implementation of the mNUTRIC score as a routine practice in the facility's CCUs may result in improved patient outcomes by identifying patients who may benefit from prompt, intensive nutrition therapy.

Ashley Childers, Nutrition and Healthcare Management, Graduate

A PROSPECTIVE STUDY OF MEDITERRANEAN DIET ADHERENCE AND COGNITIVE DECLINE

Faculty Mentor: Martin Root, Health Sciences

Coauthor(s): Martin Root, Kimberly Fasczewski, Melissa Gutschall

BACKGROUND: Cognitive impairment affects 16-25% of older adults in the US and Canada and has profound effects on quality of life. Adherence to a Mediterranean Diet (MedDiet) has been associated with better cognitive function in some studies, but results have been inconsistent. OBJECTIVE: To analyze the relationship between MedDiet adherence and rates of cognitive decline. METHODS: Data were taken from the ARIC study, which included 15,792 adults age 45-64 from 4 counties in the US. Food frequency questionnaire data was used to assess MedDiet adherence according to the Mediterranean-Style Dietary Pattern Score. Cognitive function was assessed using Delayed Word Recall, Digit Symbol Substitution, and Word Fluency tests administered at baseline and six-year follow-up. Linear regression was used to assess the association between MedDiet score and change in cognitive function. RESULTS: The average MedDiet score was 20.0 ± 6.5 with sub-scores for whole grain and wine consumption at 1.2 ± 1.1 and 0.4 ± 1.1, respectively. There was no significant relationship between MedDiet Score and cognitive change in univariate, demographic, or complete models. CONCLUSIONS: ARIC participants had low MedDiet adherence, particularly in whole grain and wine consumption. MedDiet adherence was not significantly associated with cognitive change among ARIC participants.

Abigale Clapham, Nutrition and Healthcare Management, Graduate

DOES BODY MASS INDEX MEDIATE THE ASSOCIATION BETWEEN MEAT INTAKE AND INSULIN SENSITIVITY?

Faculty Mentor: Martin Root, Health Sciences

Coauthor(s): Martin Root, Kyle Thompson, Margaret Barth, Camille Ekker-Runde

The purpose of this study was to examine the possible inverse relationship between total meat intake or processed meat intake on insulin sensitivity as mediated by body mass index (BMI). The Quantitative Insulin Sensitivity Check Index (QUICKI) was used to calculate participants' insulin sensitivity. Cross-sectional data were used from Visit 1 of the Atherosclerosis Risk In Communities cohort. Mediation analysis was conducted using the PROCESS macro for SPSS developed by Andrew Hayes. The mean BMI was 27.3 kg/m2, total meat intake was 1.76 servings per day, processed meat intake was 0.44 servings per day, and the mean QUICKI score was 0.34. As hypothesized, total meat intake was significantly associated with lower insulin sensitivity. The significant inverse total effect model was -0.0044 (95% CI: -0.0054, -0.0034) with a significant inverse BMI effect [-0.0029 (95% CI: -0.0033, -0.0024)] indirectly accounting for the majority of the total effect. The indirect effect accounted for 66% of the association between total meat intake on QUICKI. Processed meat was also significantly associated with decreased QUICKI. However, despite having significant p values for each effect, the association between processed meat intake and QUICKI as mediated by BMI was considered inconclusive due to overlapping confidence intervals of the direct and indirect effects. These findings suggest that the majority of the small effect of meat on insulin sensitivity is contributed by its effect on BMI

Emily Curlin, Nutrition and Healthcare Management, Graduate

EXTREME BIRTHWEIGHTS AND METABOLIC SYNDROME IN ADULTHOOD

Faculty Mentor: Martin Root, Health Sciences

Coauthor(s): Martin Root, Margaret Barth, Kyle Thompson

BACKGROUND: The extent to which birthweight influences future risk of developing metabolic syndrome and chronic diseases has been widely theorized. It remains unclear, however, if other environmental and social factors may confound these findings.

RESEARCH OUTCOME: This study examined the effects of high birthweight (HBW) and low birthweight (LBW) on an individual's risk of developing metabolic syndrome later in life; with consideration of lifetime behavioral, social, and environmental factors.

METHODS: The Atherosclerosis Risk in Communities (ARIC) dataset was used to identify individuals with metabolic syndrome and individuals who reported either HBW or LBW. Pertinent covariates were also included in the analysis such as childhood and adulthood risk factors for metabolic syndrome. Logistic regression analysis was used to compare LBW and HBW with metabolic syndrome.

RESULTS: A possible relationship between LBW and future risk of metabolic syndrome was attenuated by pertinent socioeconomic and lifestyle-related risk factors that defined both the participant and their familial influence. A link between HBW and metabolic syndrome was not found.

CONCLUSIONS: This work does not support a correlation of birth weight with adult metabolic syndrome. However, the multifaceted risk factors in the development of metabolic syndrome may be attributed to genetic, socioeconomic and lifestyle factors that similarly influence a mother's likelihood of delivering an extreme birthweight infant.

Katharine Garrity, Nutrition and Healthcare Management, Graduate

REPORTED SELF EFFICACY AMONG PARTICIPANTS OF NUTRITION SERVICES AT A LOCAL FOOD BANK AND RESOURCE CENTER IN RURAL NORTH CAROLINA

Faculty Mentor: Melissa Gutschall, Health Sciences

Coauthor(s): Melissa Gutschall, Margaret Barth, Kyle Thompson

Food insecurity plagues roughly 48.1 million, or 1 in 6 Americans, with over half of all very food insecure counties categorized in a rural setting. The Hunger and Health Coalition (HHC), a local food and resource center, has been addressing the needs of vulnerable populations in Watauga County where more than 19% of residents are living in food insecure households. This study explored a community-academic partnership and the feasibility of designing and implementing initiatives aimed to increase knowledge and self-efficacy to improve food selection behaviors, which in turn will increase food security among food-pantry clients. This study used a mixed-methods design, aimed to collect qualitative and quantitative data through a three-step approach: observation and feedback, design and implementation, and evaluation. Data was collected via previously developed and validated surveys aimed to assess participation in nutrition initiatives and subsequent levels of knowledge and self-efficacy. Data collection was completed in the fall of 2017 and was analyzed this winter/spring. Self-efficacy is an important determinant in translating that knowledge into food choices. It is intended that clients will demonstrate increased knowledge, skills, food security, and self-efficacy for making healthier food selections and using donated food items to prepare nutrient-dense meals. Insights gained through implementation and evaluation will result in future program improvements to reach the target audience.

Cameron Hubbard, Nutrition and Healthcare Management, Graduate

FOOD SECURITY STATUS IN RURAL NORTH CAROLINA: EXPLORING COPING STRATEGIES AMONG COMMUNITY RESIDENTS

Faculty Mentor: Melissa Gutschall, Health Sciences

Coauthor(s): Cami Hubbard, Lanae Ball, Adam Hege, Richard W. Christiana, Conner Gleason-Wallace

Food security status (FSS) is associated with obesity and other nutrition-related chronic diseases. The purpose of this study was to determine: 1) the FSS and 2) food coping strategies utilized among a rural population. Partnerships were formed with two local churches around improving food access in the community. A cross-sectional survey (n=95) was administered at both church locations. The survey included the following topics: 1) USDA 10-Item Household FS Module, 2) food coping strategies, 3) dietary and physical activity behaviors, and 4) socio-demographic information. Responses were coded and analyzed using SPSS. The university IRB approved the study. Of the 95 respondents, 48.4% were food insecure and, of those, 22.1% indicated "very low food security with hunger." FSS was a significant predictor of use of food coping strategies. The five most frequently indicated coping strategies were: 1) attending community functions where there was free food ($X^2(10)=22.711$, $p<.05$), 2) purchasing cheap, processed food (e.g. ramen, noodles, frozen pizza, candy) ($X^2(10)=26.829$, $p<.05$), 3) stretching food to make it last longer ($X^2(10)=33.311$, $p<.01$), 4) obtaining food from a food bank or food pantry ($X^2(10)=54.959$, $p<.001$), and 5) borrowing money for food ($X^2(10)=49.436$, $p<.001$). Communities can intervene short-term to provide access to healthy foods for food-insecure populations. Churches and faith-based communities are a prime target for improving food access including the establishment of food pantries and community gardens.

Kathleen Jablonski, Nutrition and Healthcare Management, Graduate

EVALUATING ADHERENCE TO A VOLUME-BASED FEEDING PROTOCOL IN FOUR ADULT INTENSIVE CARE UNITS

Faculty Mentor: Martin Root, Health Sciences

Coauthor(s): Martin Root, Heather Pitts, Kimberly Harris, Kyle Thompson, and Debbie Underwood

Objective: The objective of this observational study was to evaluate adherence to a volume-based enteral nutrition catch-up feeding protocol in ICU patients in four adult ICUs in a comprehensive medical center. Methods: Data was collected for eight days in each of the four adult ICUs at Moses H. Cone Memorial Hospital. Between the hours of 7:45 am and 8:15 am, the enteral formula volume provided to each patient in the previous 32 hours and in the previous eight hours was recorded after checking the feeding pump of each patient receiving continuous enteral nutrition. The previous 24-hour volume was calculated by subtracting the 8-hour volume from the 32-hour volume. The EMR was used to collect data regarding each patient's enteral nutrition prescription. Results: Data were excluded if the feeding had been stopped during the previous 24 hours due to patient intolerance and had not yet been restarted or if the patient's feeding tube had been removed and not yet replaced. The mean of all percent goal volume data (81.2%, SD = 24.5%) was statistically different ($p < 0.001$) from the reference standard and goal of 100%. There were no statistically significant differences between ICUs ($p = 0.155$). Conclusions: The results show that the adult ICUs did not achieve the goal of providing patients with 100% of their goal 24-hour enteral feeding volume. Opportunities for improvement may include protocol education directed specifically toward RNs.

Kelsey Johnson, Nutrition and Healthcare Management, Graduate

DEFINING THE TRADITIONAL APPALACHIAN DIET: AN ANALYSIS OF KEY REGIONAL COOKBOOKS

Faculty Mentor: Melissa Gutschall, Health Sciences

Coauthor(s): Cody McRee, Kyle Thompson, Alisha Farris, Melissa Gutschall

Objective: Convenience foods have become more popular in the United States, including rural Appalachia. Many processed foods contain excessive amounts of sodium, sugar and saturated fats, contributing to diet-related health disparities. Studying historical Appalachian recipes may help develop effective dietary interventions based on traditional whole foods.

Design: Qualitative exploration of 15 historical Appalachian cookbooks.

Methods: Comprehensive cookbooks reflecting the traditional Appalachian diet were selected with advisement from the research librarian at the W.L. Eury Appalachian Collection. Cookbooks were coded into four major categories based on previous research and 31 sub-categories with comparison and consensus of findings among the researchers.

Results: Fruits and vegetables were the most frequently mentioned food group, (2,720 mentions combined), followed by added fats and sugars (2,002 mentions). The top fruit and vegetable sub-categories were tree fruits (297 mentions), berries, (267 mentions), fruit vegetables (601 mentions), and bulb vegetables (490 mentions).

Conclusion: While previous analyses from oral history interviews also suggest a significant dietary basis of fruits and vegetables, diets were dominated by beans and corn. Future research may include comparing cookbook ingredients to actual reported dietary patterns to develop meaningful interventions aimed at increasing fruit and vegetable consumption for rural Appalachian patients.

Jordan Miller, Nutrition and Healthcare Management, Graduate

PREVALENCE AND CORRELATES OF CAMPUS FOOD INSECURITY AMONG FRESHMEN ATTENDING A UNIVERSITY IN APPALACHIA

Faculty Mentor: Laura McArthur, Health Sciences

Coauthor(s): Laura McArthur, Elaine Wartinger, Kimberly Fasczewski

Introduction: While food insecurity (FI) is a prevalent problem among college students, no previous studies have identified rates among college freshmen. This study aimed to identify prevalence and correlates of FI among college freshmen.

Methods: A descriptive, cross-sectional survey. Freshmen (N= 2,744) received an email recruitment letter containing a link to an online questionnaire administered using Qualtrics. Data were analyzed using SPSS. Food security status was determined using the USDA/ERS AFSSM. Descriptive and inferential procedures were performed ($p \leq 0.05$ significance).

Results: Of the 413 viable responses, the AFSSM indicated a freshmen FI rate of 21.4%. FI was correlated with poorer academic progress ($p<0.01$), meal skipping ($p<0.05$), coping strategies usage ($p<0.0001$), and increased non-food expenses ($p<0.05$). Males were nearly twice as likely to be FI ($p<0.001$) and financial aid users were half as likely ($p<0.05$). FI was associated with feeling frustrated and anxious (35.7%, $p \leq 0.005$). Most FI students desired a more affordable meal plan, a job, or more financial aid (55.6%-63.0%).

Conclusions: FI affects one out of five freshmen at ASU. The results suggested an association between FI and academic progress impairment, meal skipping, financial stress, and negative emotions.

Julieanne Pike, Nutrition and Healthcare Management, Graduate

TIME COURSE OF BLUEBERRY INGESTION ON MEASURES OF ARTERIAL STIFFNESS AND BLOOD PRESSURE

Faculty Mentor: Lisa McAnulty, Health Sciences

Coauthor(s): Conner McGraw, Beth Magyar, Ali Pressley, Price St. Clair, Steve McAnulty, Kyle Thompson, Scott Collier, Lisa McAnulty

Introduction: Blueberries possess anthocyanins which exert anti-hypertensive properties and may reduce blood pressure. The objective of the study was to examine the effect of daily blueberry ingestion on blood pressure (BP), augmentation index (AIx), and central pulse wave velocity (cPWV) weekly over a three-week period and to assess acute effects one and two hours post-consumption. Methods: Participants (n=22), who met inclusion criteria and were 40 to 70 years of age, were randomized into group A (n=10) or B (n=12) and consumed 38 g/d of freeze-dried blueberry powder or placebo, respectively, for three weeks. BP, AIx, and cPWV were measured at baseline and weekly. At the end of week three, 38 g of A or B were ingested, and acute measures were taken at one and two hours post-consumption. Results: Chronic ingestion of treatments over time resulted in significant treatment x time interaction for SBP. Upon further comparison, no significant point to point differences were observed. Main effects were Treatment (p=0.109), Time (p=0.593), and Treatment x Time Interaction (p=0.036). However, acute ingestion of blueberry powder resulted in significant Time (p=0.03) and Treatment x Time Interaction (p=0.015). No significant differences were found for DBP, AIx, or cPWV. Conclusion: The change in acute SBP was not found to be mediated by a change in vessel distensibility, since cPWV was not altered. Therefore, the change was due to a physiologic change not examined in this study.

Mabel Rodriguez, Nutrition and Healthcare Management, Graduate

DEVELOPMENT OF INTAKE DOCUMENTATION TOOL FOR ORAL NUTRITION SUPPLEMENTS: A QUALITY IMPROVEMENT PROJECT

Faculty Mentor: Lisa McAnulty, Health Sciences

Coauthor(s): Lisa McAnulty, Kyle Thompson, Alisun Boldrini, Margaret Barth

PLAN: Evidence suggests that oral nutrition supplements (ONS) improve nutritional status, reduce length of hospital stay (LOS), reduce readmissions, improve wound healing, and, overall, enhance quality of life. The objective of this Quality Improvement Project (QIP) carried out in a community hospital in North Carolina was to determine if implementation of an Intake Documentation Tool (IDT) improved the recording of ONS intake in the electronic medical record (EMR) by Registered Nurses (RNs). DO: The Malnutrition Screening Tool (MST), a validated tool to determine nutrition risk, is administered to all patients. An ONS is automatically ordered for any patient with a MST score >2 and/or BMI <18. It was thought by the investigators that the IDT might improve documentation compliance by allowing RNs to delegate monitoring to nutrition staff including Registered Dietitian Nutritionists, Certified Nursing Assistants, and meal delivery employees. STUDY: A total of 67 ONS orders over the course of four months were compared to the EMR. Prior to the implementation of the IDT, compliance rate was 6.4% and increased to 40.3% following introduction of the IDT. This is an ongoing QIP. ACT: Implementation of the IDT by appropriate staff improved ONS documentation by the RNs. The IDT was effective in increasing ONS documentation by 34%; however, the desired goal of 90% was not achieved due to the need for ongoing education, training, and reinforcement of the IDT.

Dylan Rudisill, Nutrition and Healthcare Management, Graduate

PREVALENCE AND CORRELATES OF FOOD INSECURITY AMONG UNDERGRADUATES AT APPALACHIAN STATE UNIVERSITY: A GENDER ANALYSIS

Faculty Mentor: Laura McArthur, Health Sciences

Coauthor(s): Laura McArthur, Lanae Ball, Don Holbert

Food insecurity amongst college students is becoming of increasing concern as studies are finding that college students are facing food insecurity at rates much higher than the national average. The definition of food insecurity is having limited or uncertain access, in socially acceptable ways to an adequate and safe diet that sustains an active and healthy life. This present study aimed to compare food insecure male and female students and determine possible predictors of food insecurity for both genders. A cross-sectional anonymous survey was distributed via email during the 2015-2016 academic year to assess food security status along with other factors such as coping strategies, money expenditure, academic progress, and demographics. A total of 393 cases of food insecurity were identified with 39% being male and 61% being female. We were also able to identify the following predictor variables for food insecurity and are as follows: Male gender, results of the coping strategy scale, and students who don't cook for themselves. Given this high prevalence of food insecurity among Appalachian State University Students, there is a need for state and university level policy change to improve access to food among undergraduate students.

Caroline Sharrits, Nutrition and Healthcare Management, Graduate

SLIDING SCALE INSULIN VS. SLIDING SCALE AND BASAL-BOLUS INSULIN REGIMENS IN HOSPITALIZED DIABETIC PATIENTS: A QUALITY IMPROVEMENT PROJECT

Faculty Mentor: Lisa McAnulty, Health Sciences

Coauthor(s): Lisa McAnulty, Kyle Thompson, Melinda Parks

Plan: The purpose of this quality improvement (QI) project was to describe key characteristics of patients in a regional medical center assigned to sliding scale insulin compared to sliding scale plus basal-bolus insulin, determine any associations of these key characteristics with insulin regimen, and identify possible areas for further improvement related to the topic of this QI.

Do: This retrospective chart review was conducted using adult diabetic patients that stayed on the general medical floor of a regional medical center in North Carolina from September 1st, 2017 to September 25th, 2017. All patients were assigned by a physician to receive sliding scale insulin or sliding scale plus basal-bolus insulin, based on blood glucose control. Age, gender, height and weight for determination of body mass index (BMI), and length of hospital stay (LOS) were recorded, and data were analyzed using chi-square analysis.

Study: Of the 39 patients in this study, 24 were given sliding scale insulin alone and 15 were given basal-bolus insulin in addition to sliding scale insulin. Chi-square analysis showed no association between group assignment and age, gender, obese or non-obese status (BMI), or LOS ($p>0.05$ for all measures).

Act: No significant association was observed for insulin regimen assigned and age, gender, BMI, or LOS. Future QI projects should investigate the relationship between insulin regimen assigned and hospital diagnosis, hemoglobin A1c, home diabetic medications, and other relevant parameters.

Corinne Spiczenski, Nutrition and Healthcare Management, Graduate

DIFFERENCES IN LEARNING OUTCOMES BETWEEN UNDERGRADUATE DIETETICS STUDENTS PARTICIPATING IN CAMPUS-BASED VS. COMMUNITY-BASED FOOD PRODUCTION EXPERIENCE

Faculty Mentor: Melissa Gutschall, Health Sciences

Coauthor(s): Kelsey Keenan

Introduction Undergraduate students in the health-related fields participating in community service-learning opportunities may improve discipline-specific learning competencies and cultural competency while providing services to community members in need. Service-learning opportunities have been included within the curriculum of undergraduate programs, and have been effective at achieving desired learning outcomes. Limited evidence is available regarding community-academic partnerships targeting food security. The objective of this project was to compare learning outcomes of undergraduate dietetic students completing their Quantity Food Production experience in two different settings: on campus (OC), versus the local food pantry, Hunger and Health Coalition (HHC). Methods HHC (n=10) prepared 75 meals for community members. Following intervention, students were asked to self-rate their achievement of learning outcomes. Rating scales included 18 dietetics competencies, rated as exceeds, meets, or did not meet expectations, and five service learning competencies, rated using a 5-item Likert scale. An independent samples t-test was used to assess the differences in responses between groups. Results HHC demonstrated significantly higher learning outcomes for four of the dietetics competencies and four of the service learning outcomes when compared to OC ($p<0.5$). The results of this project suggest that undergraduate dietetic students working in the local food pantry improved specific learning outcomes.

Christopher Thompson, Nutrition and Healthcare Management, Graduate

IMPROVING MEAL DELIVERY TIMES IN A ROOM SERVICE FOODSERVICE MODEL IN A SUBURBAN HOSPITAL: A LEAN SIX SIGMA APPROACH

Faculty Mentor: Kyle Thompson, Health Sciences

Coauthor(s): Lyn Haft; Marlon Davis; Steven McAnulty; Kyle Thompson

Introduction: Few publications have documented the impact of implementing a room service foodservice model in health care facilities currently operating traditional foodservice models. This research utilized Lean Six Sigma methodology for the purpose of improving tray line production and meal delivery times. Method: The investigator spent six weeks evaluating a suburban general hospital's room service foodservice model and implementing an intervention for the purpose of improving tray line production and meal delivery times while following Lean Six Sigma methodology. Target meal delivery times were defined in the first phase and patient meal tray delivery time metrics were collected in the second phase. A detailed work flow chart was developed to identify an area that would benefit from intervention in the Improve phase. The intervention involved pre-wrapping silverware for placement on meal trays. Results: There were no significant reductions in any of the measured metrics. Although not statistically significant, the minutes required for Meal Delivery Time as a component of the complete set of metrics were reduced following the intervention. Conclusion: Although not significantly reduced, before- and after- comparisons of actual Meal Delivery Time as a component of the total meal delivery process indicate that Lean Six Sigma may be a promising avenue for further study of other interventions or combinations of intervention.

Elaine Wartinger, Nutrition and Healthcare Management, Graduate

PREVALENCE AND CORRELATES OF FAMILY AND CAMPUS FOOD INSECURITY AMONG FRESHMEN AT A UNIVERSITY IN APPALACHIA

Faculty Mentor: Laura McArthur, Health Sciences

Coauthor(s): Laura McArthur, Jordan Miller, Kimberly Fasczewski

Introduction: Food Insecurity means having limited or uncertain access to nutritionally adequate and safe foods in socially acceptable ways. 12.3% of U.S. households had experienced food insecurity as of 2017, with North Carolina rates average at 17.7%2. College students are a vulnerable population for food insecurity.

Objective: The aim of the present study was to measure prevalence and identify correlates of on-campus and familial food insecurity.

Method: Freshman were recruited through email blast. The family and campus food security status was determined using the USDA's Adult Food Security Survey Module. Scales measured coping strategies, meal skipping, academic progress, and money spending behaviors. Statistical significance was $p < 0.05$.

Results: Scores indicated that 6.2% (n=28) of the families were food insecure during the last year the freshmen lived at home and the on-campus food insecurity rate among the freshmen was 21.2% (n=95). Correlates of family food insecurity were number of coping strategies used ($B = 0.247$, $p < 0.001$) and family composition ($B=-.148$, $p = 0.023$).

Conclusion: Food insecurity rates were found to be three times higher among college freshman in comparison to the rates reported from when students lived at home. In the home and on campus students are reporting that they stretched food, ate cheap food, and took food home to cope with their food security situation. There is a clear need for interventions and policies to be put in place to alleviate this problem for both families and students.

Desa Wells, Nutrition and Healthcare Management, Graduate

DEVELOPMENT OF HEALTHFUL LIVING CORE CURRICULUM FOR THE LETTUCE LEARN PROGRAM FOR SCHOOL-AGED CHILDREN IN WATAUGA COUNTY, NORTH CAROLINA

Faculty Mentor: Margaret Barth, Health Sciences

Coauthor(s): Melissa Gutschall, Alisha Farris, Margaret Barth.

Lettuce Learn, a nonprofit in western NC, provides training and resources to teachers, childcare professionals, and school leaders to create edible landscapes for holistic, place-based, experiential education opportunities to engage children with the natural world, enable them to make healthy choices, and encourage building sustainable communities. A need for nutrition core curriculum development supporting the heathy eating objective was identified by the Lettuce Learn leadership team. Nutrition education topics of interest were surveyed among the leadership team and 3 topics were identified related to NC Healthful Living objectives: 1. (5.NPA.1.1) use MyPlate to make healthy choices of foods/ beverages; 2. (3.NPA.1.1) use MyPlate to eat a nutritious breakfast each morning; 3. (3.NPA.2.3) categorize beverages that are more nutrient dense. The lesson plans were developed using a variety of national, recognized nutrition education resources. Each lesson included an overview and purpose; the NC Healthful Living objective; pre-test; learning objectives; an outline of key curriculum points; a post-test; and an experiential learning activity. The overall objective of this project was to develop and provide Lettuce Learn with a portfolio of 3 standard nutrition lesson plans addressing specific NC Healthful Living objectives for 3rd - 5th grade students and demonstrate/pilot implementation of the lesson plans for teachers at a Lettuce Learn-affiliated Watauga County school.

Virginia Woollens, Nutrition and Healthcare Management, Graduate

HUNGER AND ENVIRONMENTAL NUTRITION (HEN) GARDEN LAB: TEACHING PRACTICES AND PARTICIPANT OUTCOMES IN A GARDEN LITERACY PROGRAM TARGETING NUTRITION AND DIETETICS STUDENTS

Faculty Mentor: Margaret Barth, Health Sciences

Coauthor(s): Maggie Gartman, Lanae Ball, Martin Root, Margaret Barth, Melissa Gutschall, Laura McArthur

Objective. Evaluate teaching practices and student outcomes following a three-year garden literacy program for nutrition students.

Methods. This study used a community-based participatory approach to guide the development and implementation of HEN Garden Lab education and curriculum. The curriculum was revised and repeated over three consecutive years with different cohorts of students. Participants completed a pre/post program questionnaire to collect information related to demographics, self-efficacy (0-10 scale), and garden literacy. Teaching style effect was evaluated by a One-way ANOVA analysis of mean differences among the three years. Overall program effect was determined by an One-sample T-test. Both statistical analyses were performed on IBM SPSS 20 (2011) and had a confidence interval of 95%.

Results. The sample (N=30) was divided into three subgroups according to the program year. ANOVA results for between-year/teaching style difference were found to be insignificant ($p>0.05$). T-test analysis of overall effect for garden literacy and self-efficacy variables, were significant ($p>0.001$).

Conclusions. Teaching style showed no statistically significant difference between years however the overall effect of the program was statistically significant for each variable analyzed ($p<0.001$). HEN Garden lab had an effect on participant outcomes and its curriculum could impact garden literacy and teaching confidence of future nutrition professionals regardless of teaching style.

Jennifer Wuerffel, Nutrition and Healthcare Management, Graduate

DEVELOPMENT OF EVIDENCE-BASED NUTRITION EDUCATION MATERIALS TO MEET THE NEEDS OF CLINICAL PROFESSIONALS WORKING WITH CHILDREN AND FAMILIES AT AUTISM CARE FACILITIES THROUGHOUT CHINA.

Faculty Mentor: Margaret Barth, Health Sciences

Coauthor(s): M. Margaret Barth, Melissa Gutschall, Xuemei Zhang, Garner Dewey

Autism spectrum disorder (ASD) is one of the fastest growing developmental disabilities globally and rates continue to rise. In the US, ASD prevalence is 1 in 68 children and reports in NA, Europe and Asia show prevalence of 1-2% of population. There is growing interest, evidence, and demand for nutrition strategies used in collaboration with other modalities for treatment of autism in children. The Autism Research Institute's (ARI) Survey of Parent Rating of Treatment Efficacy and Safety showed >50% of parents reporting effectiveness and safety of various nutrition therapies for their children. The objectives of this study included review of current evidence for nutrition intervention in ASD and results from a current needs survey of children with ASD served by three pediatric autism care centers in China. Current nutrition-focused needs of children served by the ASD care centers were identified by implementing a modified questionnaire combining the Brief Autism Mealtime Behavior Inventory (BAMBI) and Brief Structured Questionnaire for Early Identification of Feeding Problems and Gastrointestinal Symptoms in Children with ASD (BEFG-ASD) among 66 parents. Results from surveys showed 68% Chinese parents reported food selectivity, 59% new food refusal, and >50% specific GI ailments. Results show need for nutrition-related approaches at the centers and, based on findings, we are developing effective nutrition education and training materials for implementation at the centers.

OFFICE OF SUSTAINABILITY

Jacob Meadows, Appalachian Studies, Graduate

SUSTAINABILITY AT APPALACHIAN STATE UNIVERSITY: A HISTORY SINCE 1899

Faculty Mentor: Lee Ball, Arts and Sciences

Coauthor(s): Lee Ball, Neva Specht

Settled in the heart of the Southern Appalachian Mountains, Appalachian State University is considered today one of the leading academic institutions in the country in sustainability. Established in 1899, the college has shown a commitment to place since its beginnings. This research through the Office of Sustainability is intended to trace this commitment to the environment throughout the school's history, and indicates that this love for the mountains and nature are deeply rooted in place, which has expanded over time. Research through the use of yearbooks, course catalogs, school newspapers, and interviews with current and previous faculty members have allowed the Office of Sustainability to share these findings through a timeline of this history. Ultimately, this project will be ongoing, continuously updated, and displayed in Plemmons Student Union.

PHYSICS AND ASTRONOMY

Claire Brown, Physics, Undergraduate

DUAL OPTICAL TWEEZERS CONFIGURATION FOR MEASUREMENT OF FORCES AND ELASTICITY IN BIOLOGICAL SYSTEMS

Faculty Mentor: Brooke Hester, Arts and Sciences

Coauthor(s): Michael Paolino, Brooke Hester

Many biological systems at the protein level exhibit some amount of elasticity which can change as that system transitions from healthy to diseased or aged. Here we present a custom-built instrument for measurements of the elasticity of such systems. Our apparatus consists of two optical tweezers which can simultaneously trap two ends of a biological object or system and observe forces induced by the biological system. Trapping occurs inside a fluidic device, allowing the introduction of different substances for monitoring their effects on the forces and elasticity of various biological systems. Two position detection beams are used for monitoring the motion of particles attached to the ends of the biological object in question, and are incident upon dual position sensing diodes. Both a description of the apparatus and corresponding methods are included.

Jeffrey Miller, Physics, Undergraduate

AN AUTOMATED OPTICAL TWEEZERS INSTRUMENT FOR CALIBRATION, DATA COLLECTION, AND EXPERIMENTAL DETERMINATION OF TEMPERATURE

Faculty Mentor: Brooke Hester, Arts and Sciences

Coauthor(s): Barry Canipe, Ben Groelke, Simon Marland, Scott Hancock

An optical tweezers (OT) system uses focused laser light to confine and manipulate nano- to micrometer-scale particles. Trap stiffness, also known as linear force constant, is an indicator of the strength of the trapping of a particle and if measured, allows for the experimental determination of the temperature of the trapped particle and adjacent fluid. For some techniques, this measurement depends on high-resolution knowledge of the position in time of the particle. A position sensing detector (PSD) returns particle position in units of volts. The process of calibrating a voltage to correspond to a particle displacement is time consuming and needs to be repeated frequently, hence the need for automation. Our instrument and software are automated to calibrate the pixel size of the camera, calibrate the position-sensing detector, collect high-resolution position data, determine temperature, and perform data analysis to determine trap stiffness with three methods: power spectrum analysis, equipartition of energy, and Boltzmann statistics. A comparison of the outcomes allows for consistency and accuracy checking of the stiffness values. We present here an overview of the methods, the instrumentation, and data collected and analyzed with our software written in LabView.

Lucian Murray, Physics, Undergraduate

A COMBINATION FLUORESCENCE ANISOTROPY AND RAMAN SPECTROSCOPY INSTRUMENT FOR OBSERVATIONS OF PROTEIN BINDING

Faculty Mentor: Brooke Hester, Arts and Sciences

Coauthor(s): Michael Paolino, Caroline Donaghy, Jennifer Burris, Brooke Hester

The Biophysics and Optical Sciences Facility (BiyOSeF) houses a custom-built fluorescence anisotropy instrument. In fluorescence anisotropy, the sample is excited with vertically polarized light. Through the phenomenon of photoselection, only molecules with a specific orientation with respect to the polarization axis of the incoming light are excited. The depolarization of any emitted light is representative of molecular motion during the excitation lifetime. The intensity of the polarization components of the emitted fluorescent light are used to calculate fluorescence anisotropy, Anisotropy is a dimensionless quantity that provides qualitative information about molecular mobility and is independent of the total intensity of the sample. This technique can be used to study, among other things, the binding of a fluorescent molecule to a large protein. Recently, we have coupled this instrument with a Raman spectroscopy high-resolution camera and spectrometer to ensure that detected light is the desired fluorescence instead of excitation light or other unwanted noise. Here we present our progress on the custom-built instrument and include some fluorescence data collected with the instrument.

Forrest Myers, Physics, Undergraduate

OPTICAL TRAPPING AND OPTIMIZED POSITION DETECTION OF METALLIC NANOPARTICLES

Faculty Mentor: Brooke Hester, Arts and Sciences

Coauthor(s): Jeff Miller, Brooke Hester

Optical trapping is the process in which a focused laser beam of light is used to trap a particle near the focus of the beam. The polarizability of metallic particles outweighs their tendency to scatter light. This makes them good candidates for optical trapping. Their tendency to scatter also makes them good candidates for detection, even for very small nanometer-sized particles. In this poster, we present our methods for optimized detection of single optically trapped metallic nanoparticles using back-focal plane interferometry and a position sensing photodiode.

Michael Paolino, Physics, Graduate

ELUCIDATION OF DMOB CATALYST IDENTITY IN THE DEGRADATION OF DMS USING FLUORESCENCE EMISSION

Faculty Mentor: Brooke Hester, Arts and Sciences

Coauthor(s): Caroline Donaghy, Brooke Hester, Megen Culpepper

In order to combat anthropogenic global warming, the release of sulfate aerosols into the stratosphere has been proposed. Sulfate aerosols are naturally deposited into the atmosphere by events such as volcanic eruptions, and contribute to global cooling by increasing atmospheric reflectivity or albedo. One of the precursors to sulfate aerosols that has been investigated as a possible candidate for release into the atmosphere is dimethyl sulfide (DMS). To be a viable candidate for such efforts, the response of DMS to different environmental factors must be understood. In this work, the degradation of DMS to methanethiol and formaldehyde with the enzyme DMS monooxygenase is investigated. DMS monooxygenase is a two component enzyme; each component catalyzes a different step in the degradation of DMS. In step one, by means of a catalyst component referred to as DmoB, Flavin Mononucleotide (FMN) is reduced to FMNH2, which is a critical component in step 2 of the reaction. The elucidation of the identity of the DmoB component involved in the first step of the reaction is the goal of this work. The binding constant of FMN to several candidates for DmoB is investigated using the technique of fluorescence emission.

Gregory Rapp, Physics, Undergraduate

CREATING AND DETECTING NANO-PRESSURE WAVES WITH OPTICAL TWEEZERS

Faculty Mentor: Brooke Hester, Arts and Sciences

Coauthor(s): Murphy D'Oyen

Nano-pressure waves are sound waves that are emitted from a nanometer-sized object and may be used for applications in microfluidic devices and piezoelectric devices. We present our work on producing and detecting nano-sound waves generated by optically trapped gold nanoshells. A nanoshell is optically trapped with optical tweezers whose intensity is modulated sinusoidally at various frequencies. The intensity modulation serves to oscillate the trapped particle around its equilibrium position yielding sound waves at the same frequency as the modulation. Here we present our progress on maximizing and detecting the sound intensity or "loudness" at the desired sound frequency.

Lucas Smith, Physics, Undergraduate

EXPLORING 12CO/13CO ICE-GAS FRACTIONATION THROUGH INTERSTELLAR ICE-ANALOGUE EXPERIMENTS

Faculty Mentor: Rachel Smith, Arts and Sciences

Coauthor(s): Elisabeth Panto, Murthy Gudipati, Rachel Smith

We conducted experiments in the Ice Spectroscopy Lab at the Jet Propulsion Laboratory (Pasadena, CA) to investigate 12C/13C fractionation in interstellar ice analogues. This study is part of a larger project funded by NASA's Emerging Worlds program to investigate early carbon chemistry – key toward understanding the formation of the solar system ~4.6 billion years ago, and the origin of prebiotic molecules. Our experiments are designed to help interpret astronomical observations of young stellar systems that have shown unusual heterogeneity in the 12CO/13CO in protoplanetary gas, with possible influence on the gas by CO ice. Toward exploring preferential desorption of 12CO from the ice – which could be due to zero-point energy differences between 12CO and 13CO, and could help explain the astronomical observations – we began investigating the effects of thermal desorption and photodesorption, two phenomena known to be important in protoplanetary ice chemistry. CO ice analogues were created and experiments conducted under near-astrophysical conditions (~10^−7 mbar and ~5 to 30 K). We determined a sublimation point for CO ice (28.5 K), which was used as a benchmark for the desorption experiments. Initial results thus far show no preferential fractionation due to either thermal desorption or photodesorption. In this ongoing study we will verify these results, and test CO ice mixed with CO2 and H2O to investigate the effects of various astrophysical ices on CO reservoirs.

PSYCHOLOGY

Yasmin Ayala-Johnson, Psychology, Undergraduate

CROSS CULTURAL EXAMINATION OF APPLICANT REACTIONS TO SOCIAL MEDIA SCREENING

Faculty Mentor: Yalcin Acikgoz, Arts and Sciences

Coauthor(s): Yalcin Acikgoz, Ezgi Demircioglu, Canan Sumer

With the popularity of social media on the rise, it is no surprise that organizations are beginning to use social networking sites SNS to screen applicants in the hiring process. However, the use of SNS screening may lead to negative outcomes in terms of applicant reactions to selection practices (Stoughton, Thompson, & Meade, 2015). With many companies becoming more internationalized in nature, and the possibility of negative reactions to SNS screening potentially not being exclusive to applicants based in the U.S. studies examining applicant reactions in different cultural settings is needed. Accordingly, we developed a cross-cultural study to compare applicant reactions to social media screening in the hiring process in which we examine reactions of applicants from two countries, the United States and Turkey. These two countries are examined because of their differences in important cultural variables such as individualism/collectivism and power distance, which have been proposed to influence applicant reactions to SNS screening (Black, Stone, & Johnson, 2015). In examining applicant reactions, applicants' perceived invasion of privacy, organizational attraction, and litigation intentions will be used as outcome variables.

Cameron Brown, Psychology, Graduate

THE DARK SIDE TO PERFORMANCE APPRAISAL

Faculty Mentor: Shawn Bergman, Arts and Sciences

Coauthor(s): Alexis Hellman, Louis Savastano, Haley Driest, Melissa Bogert, Shawn Bergman

Performance appraisals are conducted regularly in professional organizations as a means to evaluate employee performance and overall company effectiveness. Performance appraisals are often viewed as time consuming, tedious, and yield minimal positive results. Previous research has shown that employee perceptions of performance appraisals are important to consider when determining their overall effectiveness. In order to build a more positive view by managers and employees, a deeper examination into the issues of performance appraisals, especially from the manager's perspective, is needed. Our study looks at data gathered from a survey given to academic library managers at four-year colleges and universities, prompting them to evaluate the purposefulness of their current performance appraisal system. Embedded in this survey is an open-ended response question, asking directors their perceptions of the PA system in their library. Our data was extracted from 154 responses of a multifaceted survey depicting managerial perceptions of performance appraisal effectiveness. From this we determined that managers perceived an appraisal system to be most effective when it is easy to use, helps develop employees, and helps managers determine compensation decisions. Knowing what managers and employees deem as most effective in performance appraisals is the first step towards developing a system that effectively suits the needs of supervisors.

Kristin Collins, Psychology, Undergraduate

DEVELOPING A CONDITIONAL REASONING TEST FOR IMPRESSION MANAGEMENT

Faculty Mentor: Yalcin Acikgoz, Arts and Sciences

Coauthor(s): Erich Iverson, Tessa Jackson, Ashley Tollefsrud, Devon Hickman, Yalcin Acikgoz

Individuals engage in impression management behaviors in most social situations. However, one of the most prone settings to impression management is the work context. Even though the extent to which an individual performs impression management behaviors is influenced by situational factors, some people are more likely to engage in impression management behaviors than others, so it is also plausible that there is a dispositional component involved. Therefore, it is important to be able to measure the extent to which individuals are likely to engage in impression management. In this study, an innovative approach to the measurement of impression management is proposed. Specifically, as a form of implicit assessment, a conditional reasoning test (CRT) is developed to measure impression management propensity.

Katelyn Currie, Psychology, Undergraduate

BABY LED WEANING IN THE UNITED STATES: A DESCRIPTIVE STUDY OF INFANT FEEDING PRACTICES

Faculty Mentor: Amy Galloway, Arts and Sciences

A new infant weaning approach known as Baby Led Weaning (BLW) focuses on providing infants with finger and whole foods beginning at 6 months in the place of the traditional practice of spoon feeding purees and baby cereals. As the popularity of BLW grows, caregivers in the US have begun utilizing BLW with their own infants. The purpose of this study was to characterize current infant feeding practices used in the US. Participants were mothers (n = 172) of infants between the ages of 6 to 12 months who completed an online survey answering questions regarding their infant feeding practices, diet, cognitive milestones, and demographics. Caregivers who indicated they were following a BLW approach (16.9%) implemented weaning at 6 months of age and introduced family foods earlier than traditionally fed infants. Surprisingly, mothers of BLW infants had a higher average parental weight and lower level of education compared to caregivers who identified as traditional or non specified/unknown weaners. A minority of caregivers (24.4%) allowed their children to self-feed their first food, as opposed to 58.1% who spoon fed. Baby cereals accounted for 30.2% of first foods, while vegetables and fruits totaled 59.9%. Over half (53.2%) of infants ate family foods most or all of the times. These descriptive findings are a first step into understanding the use of BLW in the US, and provide a glimpse of current infant feeding practices used in some homes.

Logan Ellis, Psychology, Undergraduate

APPLICANT REACTIONS TO ARTIFICIAL INTELLIGENCE IN THE SELECTION PROCESS

Faculty Mentor: Yalcin Acikgoz, Arts and Sciences

Coauthor(s): Hannah Booth, Katie Maness, Nkem Obi-Melekwe, William Hodes, Thorpe Daley, and Yasmin Ayala-Johnson

The use of advanced technology such as artificial intelligence (AI) in the selection process has become an increasingly popular practice within organizations. However, little research has examined how applicants react to these new procedures and how those reactions may affect outcomes such as perceptions of fairness, organizational attraction, and job pursuit intentions. Previous research has suggested that the use of technology in the selection process may lead to more negative outcomes when compared to using traditional selection procedures such as face-to-face interviewing. The purpose of this study is to examine applicant reactions to the use of advanced decision-making technologies in the selection process, such as artificial intelligence systems that make hiring decisions. participants had significantly more negative reactions in terms of organizational attraction, perceptions of justice, and litigation intentions when AI was the decision-maker compared to the human condition.

Ciera Ferrone, Psychology, Graduate

QUALITATIVE ANALYSES OF CURRENT CAMPUS SEXUAL ASSAULT STEREOTYPES

Faculty Mentor: Twila Wingrove, Arts and Sciences

Coauthor(s): Amber Layfield, Twila Wingrove

We as psychologists know that people use cognitive shortcuts, including stereotypes, to understand the informational world. Stereotypes refer to overgeneralizations about individuals or groups. One practical implication of stereotypes lies in the legal system. Researchers have consistently shown that jurors are reluctant to convict in sexual assault trials (Hildebrand & Najdowski, 2015). Jurors enter the courtroom with preexisting beliefs about sexual assault victims and perpetrators that are informed by stereotypes. Rape myths are a prime example; Burt (1980), in a seminal study, defined rape myths as "prejudicial, stereotyped, or false beliefs about rape, rape victims, and rapists [which] absolve the perpetrator of guilt and increase the victim's responsibility for the assault." However, there is little research on contemporary rape myths. This study is an empirical examination of current sexual assault stereotypes. Participants, recruited via Amazon's Mechanical Turk (N = 182), completed a free response survey on general attitudes toward sexual assault victims and perpetrators. Uniquely, this study focuses on college campus sexual assault. Responses were coded thematically, and results are yielded from qualitative analyses. Ultimately, this study may inform future research on juror decision making in sexual assault cases, and may provide insight to college campuses regarding current attitudes toward campus assault.

Jarod Fyler, Psychology, Undergraduate

ADDING VS. AVERAGING: HOW DO JOB APPLICANTS EVALUATE JOB ATTRIBUTES?

Faculty Mentor: Yalcin Acikgoz, Arts and Sciences

Coauthor(s): Connor Treyball, Elise Haylett, Caitlyn Nearhood, Daniel Sumner

With a tight job market, companies are hard-pressed to attract the best applicants. With recruiting budgets skyrocketing in response to a candidate-driven market, it is important to understand how applicants evaluate employment options. Accordingly, our study examines how job candidates arrive at an overall evaluation of a job opportunity.

Precisely, the study examines whether applicants use an averaging or adding rule in evaluating job options which include multiple attributes (e.g., salary, benefits). In the averaging rule, an agent averages the values of each attribute whereas, in the adding rule, the values of all attributes of an option would be added.

To elucidate which decision-making strategy is used by applicants, an online survey will be utilized which include two fake job offers with multiple attributes. One job offer will have three highly attractive job attributes, while the other will have one moderately attractive attribute in addition to the original three. Three groups will review and rate the perceived attractiveness of the job offers, with the first group reviewing both job offers while the second and third groups reviewing one of the two offers. We hypothesize that the group reviewing both options will use an adding rule and thus rate the job with four attributes more attractive, while the job with three attributes will be rated higher by the groups reviewing one job offer.

Margaret Hancock, Psychology, Undergraduate

THE LIMITS OF SOCIAL CATEGORIES ON PRESCHOOLERS' SELECTIVE TRUST

Faculty Mentor: Robyn Kondrad, Arts and Sciences

Coauthor(s): Robyn Kondrad

When young children are learning the structure of the English language, they learn rules like "add –s if there is more than one of something." However, as a more experienced speaker would quickly point out, not all words abide by these simple principles, after all it is "women" not "womans". Before children master each of the exceptions to the general guidelines, they apply morphological rules even when not necessary; an error known as overregularization. Research shows that preschoolers struggle to resist the incorrect, overregularized forms of words (i.e. "childs") over the correct, irregular forms (i.e. "children"), even when a previously accurate informant provides the correct form (Kondrad et al., 2016). In this study, previous accuracy will be stacked with information about race and accent, which have both been shown to influence learning preferences. Children's social goals lead them to trust their in-group members, people of the same race and those without a foreign accent. However, their epistemic goals pull them to trust familiar morphological patterns. Using a slideshow with a typical selective trust paradigm to present children with a choice between an out-group member who says the tempting incorrect, over-regularized form of a word against an in-group member who says the irregular, correct form creates a direct competition between social and epistemic goals. White four year-olds should choose the irregular form presented by the White, native-accented speaker.

Michaela Kirby, Psychology, Undergraduate

DO OUR CELL PHONE PHOTOGRAPHS REVEAL OUR PERSONALITIES?

Faculty Mentor: Rose Mary Webb, Arts and Sciences

Coauthor(s): Rose Mary Webb, Christopher Holden

Many have explored what photography, autophotography, and photo essays can reveal about the characteristics of individuals, including focusing on the themes apparent in the photos themselves (Ziller, 1988), studies of themes present in photo essays of college students (Dollinger, 2017), comparing photos posted online by clinically depressed individuals and healthy controls, finding that depression could be reliably detected (Reece & Danforth, 2017). We propose an extension of this line of research in which relationships between various aspects of photographs taken by participants with their cell phones and their self-reported personality characteristics are explored. This process is informed by Gosling et al.'s (2002) behavioral residue hypothesis, stating that individuals leave evidence of their personalities in the environments in which they reside. Participants include 239 individuals identified through Amazon's Mechanical Turk who responded to a survey regarding how they used their cell phones. Participants self-reported their big-five personality traits using a 50-item personality inventory (IPIP-NEO), in addition to their narcissism and intellect, and self-reported photograph characteristics. Concurrent with past behavioral residue literature, Extraversion and Agreeableness were associated with various characteristics of photos, followed by Openness to experience, Neuroticism, and Narcissism. As an extension of past research, this study informs current and future work that attempts to advance personality assessment.

Rebekah Knight, Psychology, Graduate

AWARENESS, ATTENTION, ACCEPTANCE: HOW MINDFULNESS AS AN EMOTION REGULATION STRATEGY COULD REDUCE ANXIETY

Faculty Mentor: Lisa Emery, Arts and Sciences

Coauthor(s): Lisa Emery

This study examines how emotion regulation (i.e. suppression, mindfulness) during encoding impacts feelings of anxiety at re-exposure to the stimulus. Prior research suggests suppression is ineffective at changing negative affect short-term and may exacerbate these emotions over time. In contrast, mindfulness-based therapies have been shown to reduce chronic negative affect in those with psychopathological disorders. Prior research in our laboratory found that though mindfulness and suppression did not differ in short-term effectiveness, mindfulness improved stimulus memory in highly anxious individuals. This improvement may decrease anxiety felt upon stimulus re-exposure. To test this hypothesis, I conduct a 2 (Trait Anxiety) x 2 (Time Point) x 3 (Instruction Condition) mixed experimental design. Participants complete the Beck Anxiety Inventory prior to the study as a screen; those in the upper and lower quartiles of these scores are invited to participate. At Time 1, participants view a series of images under different emotion regulation strategies, rating each for arousal and valence reactions. At Time 2, participants view and rate these same pictures along with new pictures, without instruction conditions. I expected images viewed under suppression to increase anxiety ratings from Time 1 to Time 2, with opposite results for mindfulness. Such results could describe a mechanism by which mindfulness-based therapies exert long-term effects.

Cassidy Miles, Psychology, Graduate

FAT TALK AND ROMANTIC RELATIONSHIPS: DOES FAT TALK AFFECT RELATIONSHIP SATISFACTION AND SEXUAL SATISFACTION?

Faculty Mentor: Denise Martz, Arts and Sciences

Coauthor(s): Denise Martz, Rose Mary Webb, Doris Bazzini, and Madison Morsch

Using vignettes about a fictional couple, Michael and Jessica, the current study examined how varied levels of the woman's fat talk were perceived to affect the couple's relationship and sexual satisfaction. Participants were 239 heterosexual people (127 men, 112 women) with long-term (i.e., at least 1 year) relationship experience. Using a 3 (Level of Body Talk: Excessive Fat Talk, Minimal Fat Talk, & Self-Accepting Body Talk) x 2 (Gender: Male & Female) x 2 (Perspective: Michael & Jessica) design, participants were randomly assigned to a Body Talk and Perspective condition and were asked to read a vignette and complete questionnaires. Results indicated that participants in the excessive fat talk condition perceived lower satisfaction levels than the minimal fat talk and self-accepting body talk conditions. The satisfaction levels perceived by the self-accepting body talk and minimal fat talk conditions did not significantly differ. Participants' perceptions of the target woman's signal that she cared about her physical appearance did not significantly differ across the three conditions. Results also indicated that those in the self-accepting body talk condition perceived the target female as having more positive body image than the excessive fat talk condition and the minimal fat talk condition. Additionally, the minimal fat talk condition rendered higher levels of perceived positive body image than the excessive fat talk condition.

Madison Morsch, Psychology, Undergraduate

DEVELOPMENT OF VIGNETTES THAT EFFECTIVELY MANIPULATE WOMEN'S FAT TALK IN THE CONTEXT OF HETEROSEXUAL RELATIONSHIPS

Faculty Mentor: Denise Martz, Arts and Sciences

Coauthor(s): Denise M. Martz, Cassidy M. Miles, Doris Bazzini

The present study developed and validated vignettes capable of manipulating various levels of Fat Talk (FT) by a heterosexual woman with her male partner in the context of a committed romantic relationship. A 2 (Gender: male or female) X 3 (Vignette: Excessive FT [EFT], Minimal FT [MFT] or Self-accepting [SA] body talk) between-subjects design was used to examine men's and women's perceptions of a target woman's likeability, body size (Pulvers rating scale), and amount of FT using the Fat Talk Questionnaire (FTQ; Royal et al., 2013). Participants, recruited from MTurk, included 63 men and 43 women who were randomly assigned to read one of the vignettes before completing questionnaires. One-way ANOVA found that when the target used EFT rather than SA, she was seen as less likeable ($M = 3.29$, $SD = 1.04$; $M = 3.93$, $SD = .88$, $p = .006$, $d = -.66$). Participants perceived her body size to be larger in EFT ($M = 4.52$, $SD = 1.23$), than in MFT ($M = 3.69$, $SD = .96$, $p = .002$, $d = .75$), and SA ($M = 3.57$, $SD = 1.17$, $p < .001$, $d = .79$). One-way ANOVA on the FTQ indicated a main effect on the level of perceived FT, $F(2, 100) = 11.60$, $p < .001$, $\eta p2 = .188$. Participants perceived the woman as engaging in more FT in the EFT ($M = 43.45$, $SD = 10.02$) than in MFT ($M = 37.80$, $SD = 11.85$, $p = .041$, $d = .51$), and SA ($M = 30.14$, $SD = 14.08$, $p < .001$, $d = 1.09$). Results suggest that these vignettes are a valid way of manipulating FT for future research regarding FT in heterosexual relationships.

Megan Norris, Psychology, Graduate

PRESCHOOLERS STEREOTYPE SOCIAL TRAITS MORE READILY THAN EPISTEMIC ONES

Faculty Mentor: Robyn Kondrad, Arts and Sciences

Coauthor(s): Robyn L. Kondrad

The current study explores whether children (N = 85) generalize epistemic behaviors (i.e., past accuracy) and social behaviors (i.e., nice vs. not nice) to members who are part of the same group but with whom children have no direct experience. Four- and 5-year-olds will learn that people who belong to one group (e.g., "red group") always demonstrate one behavior (e.g., providing accurate information or being benevolent) while the other group always demonstrates the opposite behavior. Half the children will hear the group being labeled and the other half will not. Children will then need to rely on the representations they just built when they are exposed to ambiguous situations like novel objects being labeled or novel actions being displayed. Next, children will be introduced to two unfamiliar informants; one will wear a blue shirt while the other will wear a red shirt. These individuals, whom children have never met, will offer the same ambiguous behaviors as their group earlier demonstrated. Results show that in the epistemic condition, children are only willing to rely (above chance) on the stranger from the knowledgeable group when they hear the social category labels. However, in the social condition children will rely on the nice stranger regardless of labeling. These findings suggest that young children need more information about group membership before relying on someone as a good source of information; they do not need this social category information when making inferences about a stranger's social behaviors.

Marissa Sariol-Clough, Psychology, Graduate

FOLLOW MY POINT?: PRESCHOOLERS' EXPECTATIONS ABOUT VERIDICALITY DISRUPT THEIR UNDERSTANDING OF DECEPTIVE POINTS

Faculty Mentor: Robyn Kondrad, Arts and Sciences

Coauthor(s): Megan Norris, Robyn Kondrad

Preschoolers struggle to correctly interpret deceptive pointing. This study explores whether this difficulty stems from a bias to follow pointing gestures or a bias to believe those who point. Four-year- olds saw either deceptive pointing (which violates both biases) or true negative pointing (which only violates children's bias to follow pointing). In both conditions, an experimenter hid a sticker under one of two cups and pointed to the empty one. In the deceptive condition, the experimenter falsely claimed she would point to where the sticker was, whereas in the true negative condition, she truthfully claimed she would point to where the sticker was not. Preschoolers correctly interpreted true negative, but not deceptive, pointing. Inhibitory control predicted children's understanding of true negative points. Explaining how they were tricked predicted children's response to deceptive points. These results suggest that children's difficulty with deceptive pointing stems from their bias to believe others when they point. Violations of this bias overwhelm other cognitive abilities that otherwise help children interpret others' communication.

Laura Sarsony, Psychology, Undergraduate

EFFECTS OF GENDER AND AGE WITHIN DISGUST SENSITIVITY

Faculty Mentor: Amy Galloway, Arts and Sciences

Coauthor(s): Amy Galloway

Disgust sensitivity (DS) is the strength of response an individual has to a disgust-eliciting stimulus, such as feces or a bloody injury. It is believed that DS evolved as a way to prevent illness and to protect an individual from potentially harmful substances. Previous research suggests a relationship between gender and DS, as women tend to be higher in DS than men. The purpose of this study was to replicate this find using a larger, representative sample, and to investigate levels of DS across the lifespan. We hypothesized that younger women would have higher levels of DS, particularly within the contamination and core DS subscales. Participants in this study included US citizens who were online MTurk workers. There were 1,339 participants, 804 women and 535 men, all aged 18 years-old to 83 years old. Participants completed the Disgust Scale, which included the Core Disgust, Animal-Reminder, and Contamination Subscales. Using multiple regression analysis, results showed that in general, gender and age reliability predicted several different types of disgust sensitivity, particularly the Core subscale ($R2 = .099$, $F(3,1335) = 48.69$, $p < .001$, age ($\beta = -.004$, $p < .01$), gender ($\beta = .452$, $p < .001$). This demonstrates that younger females were more likely to report higher levels of DS, supporting the hypothesis that younger women have the highest levels of DS. These results will be interpreted through an evolutionary as well as a cultural lens.

RECREATION MANAGEMENT AND PHYSICAL EDUCATION

Emily Cluen, Recreation Management, Undergraduate

OUT OF THE CABIN, OUT OF THE CLOSET: THE TRANSFORMATIVE EXPERIENCES OF CAMP AND IDENTITY EXPLORATION

Faculty Mentor: Joy James, Health Sciences

This study involves interviewing LGBT+ identifying people who have experience at residential summer camps. They are asked about their identities within the community and how the sharing/non-sharing of that aspect of their identity affected their relationships and experiences at camp, as well as that camp's stance on minority sexualities. A qualitative analysis was conducted on seven study participants. The resulting theme was camp as a transformative experience and identity exploration. This will help camps in providing a more welcoming space to staff and campers of all identities.

Annie Pharr, Recreation Management, Undergraduate

THE BENEFITS OF CAMP: NECESSITY OF THE OUTDOORS AND COMMUNITY IN THE DIGITAL AGE

Faculty Mentor: Joy James, Health Sciences

In today's culture, one of the biggest criticisms is that people spend less time outside, and less time with people face-to-face (Louv, 2005; Orr, 2004; Montessori, 1967). In this age where technology is of growing importance, places where children can spend time outdoors, such as summer camp, are even more vital to their growth and well-being (Louv, 2005). Existing camp research and trends, coupled with the outdoor setting, have been shown to have positive impacts on youth development (Chawla, 2015). This study explores the need for research to help improve the camp experience from the child's perspective. The purpose of this study is to examine how the camp natural setting and community impacts the youth experience. The research questions are: 1) How spending time in the outdoors is valuable, and 2) what is the summer camp experience's impact on children's developmental skills. The methods of my study include a pre- and post-survey I administered to campers during the summer of 2017. The surveys measured campers' self-reported progress during camp based on 4 measures of youth development from the ACA Youth Outcomes Battery: teamwork, community, affinity for nature, and responsibility. To my knowledge, this study was the most recent collection of youth development data from campers themselves. Initial survey results showed no significance, however this may be a reflection of the short length of camp sessions, revealing the need for more research from the youth perspective to maximize developmental benefits.

SOCIAL WORK

Lyndsay Wilcox, Social Work, Undergraduate

EXPLORING COPING SKILLS OF HOSPITALIZED CHILDREN: A CHILDREN'S BOOK PROPOSAL

Faculty Mentor: Peter Fawson, Health Sciences

Hospitalization is not an easy challenge to face, especially for children. Hospital stays typically involve uncomfortable or painful procedures experienced in unfamiliar environments with unfamiliar people. Children may become fearful in anticipation of, or during hospital stays. Because of their developmental level, children ages 5-9 years old need effective coping skills that allow them to navigate stressors that come with hospitalization. Children ages 5-9 are especially vulnerable to hospital stressors and in need of effective coping skills due to high rates of hospitalization. Along with these children, parents and siblings also need effective coping skills and knowledge of hospital stressors to maintain their own health and provide support for the patient. The implementation of an interactive children's book intervention would be beneficial to pediatric hospital patients, their siblings and their parents. The proposed intervention will incorporate knowledge from Erikson's Psychosocial Stages, Family Emotional Systems Theory, research on common hospital stressors, and previous evidence of the effectiveness of children's books about hospitalized children.

SOCIOLOGY

Zachary Kopkin, Appalachian Studies, Graduate

SCRAPBOOK OF APPALACHIAN STORYTELLING AND THE LANDSCAPE

Faculty Mentor: Robert Perdue, Arts and Sciences

I am researching the relationship between Appalachian storytelling traditions and people's sense of connection to the earth. I ask, "What can storytelling reveal about the various ways Appalachian people understand their connections to the earth?" I consider traditional and emerging storytelling styles and technologies, from ballads, oral performance, and literature to participatory digital chatbots. I also pay attention to the diverse identities of storytellers in Appalachia, including differences in race, gender, age, religion, and ability.

Other scholars, such as bell hooks, Chelsea Walker, and John Inscoe, have noted the intense intertwining of storytellers' subjectivities with their landscapes. This topic matters because "storytelling ... [helps] people to develop and hold on to values. One of the most fascinating things about humankind is that each generation establishes its own values and tries to pass them along, just as the next generation establishes its own values and tries to pass them along" (Spaulding, The Art of Storytelling).

Based on my research, I am producing a physical scrapbook that artistically incorporates my reflections on and analyses of a range of Appalachian stories. In the scrapbook, I will wrestle with my own Appalachian stories and incorporate personal photography and art. I will eventually digitize the scrapbook, adding nature field recordings to the digital presentation. Two patriarchs in my family are well known for their storytelling, so I hope to incorporate their voices alongisde mine.

SUSTAINABLE TECHNOLOGY AND THE BUILT ENVIRONMENT

Katie Lorenzini, Appropriate Technology, Undergraduate

ALTERNATIVE BILLING METHODS FOR WATAUGA COUNTY MUNICIPAL BUILDINGS

Faculty Mentor: Jason Hoyle, Fine and Applied Arts

Coauthor(s): Jason Hoyle

Advanced metering infrastructure allows electricity usage to be monitored on a near real-time basis, and makes possible a variety of innovative approaches to encouraging more efficient and productive electricity use. This study analyzes historical trends in the energy use of Watauga County municipal buildings located in the service territory of New River Light & Power and explores the potential savings and other impacts of smart grid technology by simulating alternative billing approaches. Using kW demand and kWh usage of 18 county electric accounts between 2012 and 2017, the seasonality coincidence of electricity use was examined and used as a baseline for estimating future use and costs. Then the impact of alternative billing structures, such as virtual account aggregation, virtual net metering, and combined billing of multiple accounts were examined to determine the potential impact of these innovative billing approaches, identify key factors affecting the value of these alternative approaches, and better understand how smart grid technology can be leveraged to improve the efficiency, cost-effectiveness, and convenience of electricity billing structures.

Chris Stevens, Appropriate Technology, Graduate

TESTING THE RUGGEDNESS OF A SMALL, MOBILE PHOTOVOLTAIC SYSTEM TO PRODUCE RECREATIONAL WATTAGE FOR OFF GRID APPLICATIONS FOR COMMUNITY ENGAGEMENT

Faculty Mentor: Brent Summerville, Fine and Applied Arts

The goal of this project is twofold: First is to test the ruggedness and performance of a dual solar module setup that replaces a standard truck bed cover. The second is to raise awareness and curiosity to the common implementation of solar renewables that are mobile for such functions as recreational camping, off road expeditions, and emergency vehicle boosting.

The entire system will be housed in the bed of a 2016 Chevy Silverado 1500. The first step will be to build the custom mounting to hold the two modules together and then secure them to the truck bed, with a flush height to maintain a reduced aerodynamic load. The goal is to create a flush mounted system to replicate a traditional truck bed cover, protecting the bed from the elements while both stationary and mobile.

The system as a whole has travelled approximately 3000 miles to date, starting over the 2017 Christmas break, covering ground from Boone, NC to Flint, Mi, Fayetteville, WV, and Myrtle Beach, SC to name a few. The entire trip has been documented and notes taken about different elevations and meteorological observations. Weather observations include high wind chill, sub zero temperatures, changes in elevations (3333 feet above sea level in Boone to 0 feet above sea level in Myrtle Beach), and plentiful snow and rain.

THEATRE AND DANCE

Alison Bird, Dance Studies, Undergraduate

THE PILATES METHOD AND ITS RELATIONSHIP TO PHYSICAL AND MENTAL AWARENESS: A PHENOMENOLOGICAL STUDY

Faculty Mentor: Marianne Adams, Fine and Applied Arts

The Pilates method, originally known as Contrology, was created by Joseph H. Pilates in the 1920s. This is a phenomenological study based on a daily practice of the Pilates method. The research question, "will a deepening of awareness in sensations while going through the Pilates method begins to bring an awareness to my physical and mental body?" To record the experiences, I journaled before and after each daily practice. I also used the Mindful Attention Awareness Scale to keep track of my mindfulness which showed a gradual increase throughout the process. The analysis of my journal led to four main themes, a decrease in lower back pain, an increase in body awareness led to a change in body image, an increase in mindfulness and an increase in a present state of mind.

WATAUGA RESIDENTIAL COLLEGE

Daniel Brehm, Appropriate Technology, Undergraduate

SUSTAINABLE WASTE MANAGEMENT POST-NATURAL DISASTERS

Faculty Mentor: Clark Maddux, Arts and Sciences

This paper explores what happens to waste that is produced after a natural disaster such as Hurricane Harvey or Irma. The results of placing the waste generated in landfills affect generations to come and can create many unintended complications. If communities analyze how to handle waste before they send it to a landfill, then they can eliminate the need for landfill of this material. The method used in this research was to look at past natural disasters and analyze the implementations of the waste management strategies that were used in those situations. Then, steps taken in post-storm clean up in Houston and Florida were examined. By combining this information and taking a critical view of all possibilities for waste management, a plan was devised to divert as much waste from landfills as possible. When communities look at this post-storm waste as a resource rather than as waste, they can reuse, remake, or repurpose all the destroyed products after a storm. In addition to eliminating the need for landfills, this proposal aims to keep communities healthy, produce local jobs, and to keep rebuilding costs after a storm to a minimum.