



THIRD ANNUAL

# UNDERGRADUATE SPRING RESEARCH SYMPOSIUM



Friday, April 12, 2019

5-7:10pm

Mountainlair Greenbrier and Blackwater Rooms

Saturday, April 13, 2019

12-4:00pm

Mountainlair Ballrooms

Welcome to the 2019 *Undergraduate Spring Symposium*.

Our third annual symposium of undergraduate research is about many things, but it's *not* about boundaries. Across 180 posters and 7 presentations, WVU student work traverses boundaries of discipline—arts, humanities, and social sciences work appears alongside STEM posters and talks. Honors College students stand next to students from every other walk of WVU life. The “lab” in question might just as well be a linguistics lab as one doing chemistry, and that chemical engineering lab is as likely to use a supercomputer as a test tube.

When you talk to our student researchers (and you *definitely* should talk to them), what you'll find in common among them is *not* found within the boundaries of field or methodology or even GPA. It's a shared spirit of inquiry, a spark of curiosity, and a passion for making new knowledge.

At WVU, we're proud of the knowledge that students build in the classroom, but also beyond the boundaries of the classroom, and its impact last well beyond a student's undergraduate career. These experiences form habits of mind and sometimes actual career-driving explorations that grow from seeds planted as early as the freshman year in our Research Apprentice Program (RAP).

This is the advantage of an institution like WVU. Our strong support of undergraduate research is natural given our Carnegie classification as a top research (R1) institution. The R1 ranking belongs to only 131 of the nearly 4500 institutions of higher learning in the U.S., denoting the highest level of research activity. But WVU is small enough that our labs are not stocked to brimming with PhD students and postdocs who might take priority over undergraduate researchers. When we talk to our most outstanding graduates, the one word we hear over and over is “opportunity.”

These opportunities depend both on engaged and inquisitive students, but also world-class research mentors in fields as diverse as public history and astrophysics, as psychology and petroleum engineering. Some faculty may mentor one student, or host a lab full of undergraduates, but no matter the arrangement, they are creating opportunities for student to participate in some of the most engaged learning around.

I hope that when you join the Mountaineer family you will say “yes” to opportunities like these that cross boundaries, and expand your mind and your resume at the same time.

Enthusiastically,



Ryan Claycomb, PhD  
Acting Dean, WVU Honors College  
Professor of English and Theatre

## ORGANIZING COMMITTEE

Dr. Ryan Claycomb, Acting Dean, Honors College  
Dr. Kevin Gooding, Living-Learning Community Coordinator, Honors College  
Dr. Kimberly Quedado, Assistant Director, Office of Undergraduate Research  
Dr. Michelle Richards-Babb, Director, Office of Undergraduate Research  
Mr. Kevin Walden, Program Specialist, Office of Undergraduate Research

***We want to take this opportunity to thank our undergraduate presenters. Their willingness to present and discuss their scholarly activities is greatly appreciated.***

***In addition, special thanks to our faculty mentors. Scholarly activities, such as research and creative endeavors, enrich the academic training of our students by establishing mentoring relationships and promoting intellectual independence and curiosity. Our students are indebted to the faculty who mentor them in research!***

## SPONSORS

The *Third Annual Undergraduate Spring Symposium*, which enhances scholarly opportunities for undergraduate students attending West Virginia University, has been enriched by the contributions, funding or otherwise, provided by the WVU programs below. We are deeply appreciative and want to thank all our sponsors for their time, effort and support of scholarly activities at WVU. Thanks to:

- Undergraduate Admissions (<https://admissions.wvu.edu/>)
- Office of Undergraduate Research (<https://undergraduateresearch.wvu.edu/>)
- Department of Biology (<https://biology.wvu.edu/>)
- Undergraduate Intercollegiate Biochemistry Program (<https://biochemistry.wvu.edu/>)
- Research Apprenticeship Program (RAP)
- Office of the Provost (<https://provost.wvu.edu/>)
- SpeakWrite (<https://speakwrite.wvu.edu/>)
- Honors College (<https://www.honors.wvu.edu/>)

## SCHEDULE (Friday April 12, 2019)

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<b>4:40-4:55 pm</b> <b>(Blackwater &amp; Greenbrier Rooms, 2<sup>nd</sup> Floor, WVU Mountainlair)</b>	<u>Presentation Setup</u> – Undergraduate presenters arrive, register and load their oral presentations on the computers.
<b>5:00-6:00 pm</b>	<u>Session I: Oral Presentations</u> – Three presentations each in categories of Human Engagement (Blackwater) and Science & Technology (Greenbrier)
<b>6:00-6:10 pm</b>	<u>Break</u>
<b>6:10-6:30 pm</b>	<u>Session II: Oral Presentations</u> – One presentation in category of Human Engagement (Blackwater)
<b>6:30-7:00 pm</b>	<u>Judging and Awards</u>

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## SCHEDULE (Saturday April 13, 2019)

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<b>10:45-11:45 am</b> <b>(Ballrooms, 2<sup>nd</sup> Floor, WVU Mountainlair)</b>	<u>RAP Celebration</u> – Small, private celebration for the RAP participants completing the full-year RAP program during 2018-2019.
<b>11:45 am- 12:00 pm</b> <b>(Ballrooms, 2<sup>nd</sup> Floor, WVU Mountainlair)</b>	<u>Poster Setup</u> – Undergraduate presenters for Session III arrive, register and put up posters. Early arrivers may leave for free lunch (Mountainlair, 1 <sup>st</sup> floor) and return at 11:55 am.
<b>12:00-1:40 pm</b>	<u>Session III: Poster Presentations</u> – Open to all and concurrent with category judging. Undergraduate presenters for Session IV arrive and register. <i>*Session IV poster presenters are encouraged to arrive early (prior to 1:40 pm) to browse and speak with poster presenters in Session III and to obtain their free lunch (which may end at 2 pm).</i>
<b>1:40-1:50 pm</b>	<u>Poster Changeover</u> – Session III poster presenters remove their posters. Session IV poster presenters put up posters.
<b>1:50-3:30 pm</b>	<u>Session IV: Poster Presentations</u> – Open to all and concurrent with category judging. <i>*Session III poster presenters are encouraged to remain to browse and speak with poster presenters in Session IV and to attend the award ceremony.</i>
<b>3:30-4:00 pm</b>	<u>Awards Ceremony and Closing Remarks</u>
<b>4:00 pm</b>	<u>Poster Take Down</u> – Any posters remaining after 4:00 pm will be removed by the staff.

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## JUDGES

Last	First	WVU Affiliation	Category Judged
Chiu	Yu-Chun	Plant and Soil Sciences	Agricultural & Environmental Sciences Posters
Dabeek	Wijdan	Human Nutrition	Agricultural & Environmental Sciences Posters
Mills	Sarah	Plant & Soil Science	Agricultural & Environmental Sciences Posters
Towey	Jessica	Microbiology	Agricultural & Environmental Sciences Posters
Adkins	Melissa	Public Administration	Behavioral & Social Sciences Posters
Alalshaykh	Nujud	Public Administration	Behavioral & Social Sciences Posters
Amanieh	Haleh	Behavior Analysis – Psych.	Behavioral & Social Sciences Posters
Roberts	Jarod	Behavior Analysis - Psych.	Behavioral & Social Sciences Posters
Wilson	Tyia	Psychology	Behavioral & Social Sciences Posters
Ferguson	Carinna	Educational Psychology	Behavioral & Social Sciences Posters; Moderator: Human Engagement Orals
Glover	Sloane	Psychology	Behavioral & Social Sciences Posters; Moderator: Science & Technology Orals
Boone	Kaitlyn	Biology	Biological & Biochemical Sciences Posters
Eastman	Brooke	Biology	Biological & Biochemical Sciences Posters
Milam	Oak	Biology - Neuroscience	Biological & Biochemical Sciences Posters
Ridgeway	Joanna	Biology	Biological & Biochemical Sciences Posters
Sanders	Lakyn	Biology	Biological & Biochemical Sciences Posters
Skibicki	Sam	Biology	Biological & Biochemical Sciences Posters
Thixton	Hana	Biology	Biological & Biochemical Sciences Posters
Alangari	Abdulaziz	Public Health Epidemiology	Health Sciences Posters
Alshamali	Ali	Dentistry	Health Sciences Posters
Arsiwala	Tasneem	Biomedical Sciences	Health Sciences Posters
Nayeem	Sara	Health Sciences	Health Sciences Posters
Petrisko	Tiffany	Neuroscience	Health Sciences Posters
Schmidt	Lexie	Neuroscience	Health Sciences Posters
Ferguson	Connor	Higher Education Administration & Integrated Marketing Communications	Human Engagement Orals
Pishotti	Gabriella	English	Human Engagement Orals
Garner	Catherine	Interdisciplinary Education (Learning Sciences)	Human Engagement Posters
Lieneman	Corey	Child Clinical Psychology	Human Engagement Posters
Miller	Myriah	Curriculum and Instruction	Human Engagement Posters
Beasley	Maryssa	Chemistry/Biophysics	Physical Sciences & Engineering Posters
Fiore	William	Physics & Astronomy	Physical Sciences & Engineering Posters
Irion	Phillip	Forensic and Investig. Sci.	Physical Sciences & Engineering Posters
Mirza	Nashid	Civil Engineering	Physical Sciences & Engineering Posters
Prince	Nicole	Chemistry	Physical Sciences & Engineering Posters
Bishop	Brent	Chemical Engineering	Science & Technology Orals
Majuta	Sandra	Chemistry	Science & Technology Orals
Middleton	Denzel	Animal science	Science & Technology Orals

***Special thanks to Dr. Jennifer Gallagher who mentored and organized the judges for the Biological & Biochemical Sciences category. All judges are current graduate students at West Virginia University. We thank them for their commitment to the research enterprise and their contributions to research communication. Their willingness to act as judges for this event enhances the presentation skills of our presenters through personalized feedback!***

## ORAL PRESENTERS – April 12, Mountainlair (1<sup>ST</sup> Authors only)

Last	First	Major	Category (Presenter Time)	Session (Time)/Room	Oral No.
<b>Brown</b>	Kaitlyn	Exercise Physiology	Human Engagement (6:10-6:30 pm)	Session II (6:10-7:10 pm)/ Blackwater	4
<b>Keech</b>	Karissa	Nursing	Human Engagement (5:40-6:00 pm)	Session I (5:00-6:00 pm)/ Blackwater	3
<b>Martinez</b>	Roberto	Civil Engineering	Science & Technology (5:40-6:00 pm)	Session I (5:00-6:00 pm)/ Greenbrier	8
<b>McClain</b>	Brittan	Biology	Science & Technology (5:00-5:20 pm)	Session I (5:00-6:00 pm)/ Greenbrier	6
<b>Parker</b>	Anne	Strategic Communications - Public Relations	Human Engagement (5:20-5:40 pm)	Session I (5:00-6:00 pm)/ Blackwater	2
<b>Tincher</b>	David	Immunology and Medical Microbiology	Science & Technology (5:20-5:40 pm)	Session I (5:00-6:00 pm)/ Greenbrier	7
<b>Tokar</b>	Kayla	Music	Human Engagement (5:00-5:20 pm)	Session I (5:00-6:00 pm)/ Blackwater	1

## POSTER PRESENTERS – April 13, Mountainlair Ballrooms (1<sup>st</sup> Authors only)

Last	First	Major	Category	Session (Time)	Poster No.
<b>Abdi</b>	Abednego	Mechanical and Aerospace Engineering	Physical Sciences & Engineering	Session III (12:00-1:40 pm)	76
<b>Agarwal</b>	Garima	Biochemistry	Biological & Biochemical Sciences	Session III (12:00-1:40 pm)	44
<b>Airing</b>	Emily	Immunology and Medical Microbiology	Health Sciences	Session III (12:00-1:40 pm)	52
<b>Altatan</b>	Yousef	Biology	Biological & Biochemical Sciences	Session III (12:00-1:40 pm)	37
<b>Amato</b>	Michael	Political Science, History, World Languages	Human Engagement	Session IV (1:50-3:30 pm)	67
<b>Ambrusico</b>	Gabriella	Strategic Communications	Behavioral & Social Sciences	Session III (12:00-1:40 pm)	29
<b>Amick</b>	Hannah	Psychology	Behavioral & Social Sciences	Session IV (1:50-3:30 pm)	16
<b>Ashton</b>	Joseph	Electrical Engineering	Human Engagement	Session III (12:00-1:40 pm)	68
<b>Baehr</b>	Reagan	Strategic Communications	Behavioral & Social Sciences	Session III (12:00-1:40 pm)	17
<b>Barney</b>	Jordan	Biology	Biological & Biochemical Sciences	Session IV (1:50-3:30 pm)	33
<b>Barton</b>	Kelsey	Psychology	Behavioral & Social Sciences	Session IV (1:50-3:30 pm)	17
<b>Bender</b>	India	sociology	Health Sciences	Session III (12:00-1:40 pm)	59
<b>Bennett</b>	Daniel	Aerospace Engineering	Physical Sciences & Engineering	Session III (12:00-1:40 pm)	77
<b>Bennett</b>	Marryn	Biology	Biological & Biochemical Sciences	Session IV (1:50-3:30 pm)	43
<b>Billman</b>	Jamie	Anthropology	Behavioral & Social Sciences	Session III (12:00-1:40 pm)	23
<b>Black</b>	Maggie	Wildlife & Fisheries Resources	Agricultural & Environmental Sciences	Session III (12:00-1:40 pm)	11
<b>Bond</b>	Katelyn	Speech Pathology and Audiology	Behavioral & Social Sciences	Session III (12:00-1:40 pm)	16
<b>Bradley</b>	Megan	Forensic and Investigative Science	Physical Sciences & Engineering	Session IV (1:50-3:30 pm)	80
<b>Brown</b>	Cornell	Marketing	Human Engagement	Session III (12:00-1:40 pm)	66
<b>Cabanillas</b>	Diego	Petroleum Natural Gas Engineering	Physical Sciences & Engineering	Session III (12:00-1:40 pm)	78
<b>Cahn</b>	Jacob	Speech Pathology and Audiology	Behavioral & Social Sciences	Session IV (1:50-3:30 pm)	15

<b>Carlson</b>	Steven	Biology	Biological & Biochemical Sciences	Session IV (1:50-3:30 pm)	34
<b>Cawley</b>	Shan	English	Human Engagement	Session III (12:00-1:40 pm)	69
<b>Cessna</b>	Lily	Immunology and medical Microbiology	Health Sciences	Session IV (1:50-3:30 pm)	54
<b>Chafin</b>	Sadie	Physics	Human Engagement	Session IV (1:50-3:30 pm)	73
<b>Chowdhury</b>	Manar	Biology	Biological & Biochemical Sciences	Session IV (1:50-3:30 pm)	46
<b>Colantonio</b>	Mark	Biochemistry	Health Sciences	Session IV (1:50-3:30 pm)	59
<b>Cole</b>	Brenna	Geology	Agricultural & Environmental Sciences	Session IV (1:50-3:30 pm)	2
<b>Colombo</b>	Colin	Mechanical and Aerospace Engineering	Physical Sciences & Engineering	Session IV (1:50-3:30 pm)	76
<b>Cook</b>	Maddison	English	Human Engagement	Session III (12:00-1:40 pm)	70
<b>Cook</b>	Oliver	Biology	Biological & Biochemical Sciences	Session IV (1:50-3:30 pm)	35
<b>Cottrill</b>	Austin	Computer Science	Physical Sciences & Engineering	Session IV (1:50-3:30 pm)	90
<b>Cottrill</b>	Dillion	Physics	Physical Sciences & Engineering	Session IV (1:50-3:30 pm)	83
<b>Cremeans</b>	Noah	Civil Engineering	Behavioral & Social Sciences	Session III (12:00-1:40 pm)	14
<b>Culp</b>	Ryan	Geology	Physical Sciences & Engineering	Session IV (1:50-3:30 pm)	84
<b>Cunningham</b>	Kara	Civil and Environmental Engineering	Physical Sciences & Engineering	Session III (12:00-1:40 pm)	79
<b>Cyphert</b>	Samuel	Aerospace Engineering	Behavioral & Social Sciences	Session III (12:00-1:40 pm)	21
<b>Daddio</b>	Mikaeyla	Public Relations	Behavioral & Social Sciences	Session III (12:00-1:40 pm)	30
<b>Dakhallah</b>	Ahmad	Biology	Biological & Biochemical Sciences	Session III (12:00-1:40 pm)	38
<b>Darragh</b>	Riley	Criminology and psychology	Behavioral & Social Sciences	Session IV (1:50-3:30 pm)	26
<b>Davis</b>	Kyle	Biochemistry	Biological & Biochemical Sciences	Session III (12:00-1:40 pm)	42
<b>DeBat</b>	Tabitha	Forensic and Investigative Science	Physical Sciences & Engineering	Session IV (1:50-3:30 pm)	81
<b>Dienes</b>	Zachary	Wildlife and Fisheries Resources	Agricultural & Environmental Sciences	Session III (12:00-1:40 pm)	6
<b>Digon</b>	Katie	Computer Science and Cyber Security	Physical Sciences & Engineering	Session III (12:00-1:40 pm)	80



<b>Dillon</b>	Lindsey	Advertising	Behavioral & Social Sciences	Session IV (1:50-3:30 pm)	28
<b>Dodd</b>	Erin	Mechanical Engineering	Physical Sciences & Engineering	Session III (12:00-1:40 pm)	81
<b>Ducci</b>	Maria	Music Therapy	Human Engagement	Session III (12:00-1:40 pm)	67
<b>Dunmyre</b>	Sam	Hospitality and Tourism Management	Human Engagement	Session III (12:00-1:40 pm)	64
<b>England</b>	Mikaela	English	Human Engagement	Session III (12:00-1:40 pm)	71
<b>Evanisko</b>	Tatianna	Environmental and Natural Resource Economics	Agricultural & Environmental Sciences	Session III (12:00-1:40 pm)	7
<b>Fain</b>	Linsey	Wildlife and Fisheries Resources	Agricultural & Environmental Sciences	Session IV (1:50-3:30 pm)	11
<b>Farley</b>	Allison	Animal and Nutritional Science	Agricultural & Environmental Sciences	Session III (12:00-1:40 pm)	13
<b>Ferrell</b>	Shianne	Psychology	Behavioral & Social Sciences	Session III (12:00-1:40 pm)	24
<b>Field</b>	Avery	Forensics	Physical Sciences & Engineering	Session IV (1:50-3:30 pm)	82
<b>Fink</b>	Garrett	Exercise Physiology	Health Sciences	Session III (12:00-1:40 pm)	50
<b>Galley</b>	Fiona	Biology and Public Health	Biological & Biochemical Sciences	Session III (12:00-1:40 pm)	35
<b>Gemmen</b>	Ellena	Mechanical Engineering	Physical Sciences & Engineering	Session III (12:00-1:40 pm)	82
<b>Gibson</b>	Jason	Aerospace Engineering	Physical Sciences & Engineering	Session IV (1:50-3:30 pm)	85
<b>Gokey</b>	Kailee	Geology	Agricultural & Environmental Sciences	Session IV (1:50-3:30 pm)	3
<b>Griffin</b>	Lauren	International Studies, History	Human Engagement	Session IV (1:50-3:30 pm)	64
<b>Gross</b>	Joshua	Mechanical Engineering	Physical Sciences & Engineering	Session III (12:00-1:40 pm)	83
<b>Harris</b>	Emma	Sport and Exercise Psychology	Behavioral & Social Sciences	Session IV (1:50-3:30 pm)	31
<b>Hasan</b>	Iraj	Biology	Biological & Biochemical Sciences	Session III (12:00-1:40 pm)	45
<b>Hauer</b>	Allison	Biochemistry	Health Sciences	Session IV (1:50-3:30 pm)	55
<b>Hayes</b>	Ryan	Exercise Physiology	Health Sciences	Session III (12:00-1:40 pm)	51
<b>Heagy</b>	Joshua	Aerospace/Mechanical Engineering	Physical Sciences & Engineering	Session III (12:00-1:40 pm)	84
<b>Hensley</b>	Samantha	Anthropology and Religious Studies	Behavioral & Social Sciences	Session III (12:00-1:40 pm)	31
<b>Hermisdorf</b>	Allen	Mechanical & Aerospace Engineering	Physical Sciences & Engineering	Session IV (1:50-3:30 pm)	78

<b>Hernandez</b>	Xochitl	Mechanical and Aerospace Engineering	Physical Sciences & Engineering	Session III (12:00-1:40 pm)	85
<b>Hodak</b>	Brianna	Biochemistry	Biological & Biochemical Sciences	Session III (12:00-1:40 pm)	43
<b>Holley</b>	Nolan	Biochemistry	Health Sciences	Session III (12:00-1:40 pm)	48
<b>Hollmeyer</b>	Max	Biochemistry	Health Sciences	Session IV (1:50-3:30 pm)	56
<b>Honerlaw</b>	Rachel	Wildlife and Fisheries Resources	Agricultural & Environmental Sciences	Session III (12:00-1:40 pm)	8
<b>Hostetler</b>	Brooke	History/ Slavic and East European Studies	Human Engagement	Session IV (1:50-3:30 pm)	65
<b>Howell</b>	Michael	Physics	Physical Sciences & Engineering	Session IV (1:50-3:30 pm)	86
<b>Huffman</b>	Justin	Chemistry	Health Sciences	Session IV (1:50-3:30 pm)	60
<b>Hull</b>	Sydney	Psychology	Behavioral & Social Sciences	Session IV (1:50-3:30 pm)	30
<b>Irabor</b>	Omosede	Political Science	Human Engagement	Session IV (1:50-3:30 pm)	70
<b>Irr</b>	Victoria	Chemical Engineering	Physical Sciences & Engineering	Session III (12:00-1:40 pm)	86
<b>Jack</b>	Hannah	English	Human Engagement	Session III (12:00-1:40 pm)	72
<b>Jett</b>	Brandelle	Animal and Nutritional Sciences	Agricultural & Environmental Sciences	Session IV (1:50-3:30 pm)	12
<b>Johnson</b>	Kirsten	Biology	Biological & Biochemical Sciences	Session IV (1:50-3:30 pm)	44
<b>Johnson</b>	Tucker	MAE	Physical Sciences & Engineering	Session III (12:00-1:40 pm)	87
<b>Jonathan</b>	Kingsly	Biomedical engineering	Behavioral & Social Sciences	Session III (12:00-1:40 pm)	19
<b>Kaper</b>	Alexis	Biology	Biological & Biochemical Sciences	Session III (12:00-1:40 pm)	40
<b>Kearney</b>	Emily	Mechanical Engineering & Physics	Physical Sciences & Engineering	Session III (12:00-1:40 pm)	88
<b>Khan</b>	Amal	Psychology	Behavioral & Social Sciences	Session III (12:00-1:40 pm)	27
<b>Kinnamon</b>	Kelsey	Sport & Exercise Psychology	Health Sciences	Session III (12:00-1:40 pm)	62
<b>Kotson</b>	Brian	Psychology	Behavioral & Social Sciences	Session III (12:00-1:40 pm)	22
<b>Krolczyk</b>	Emma	Geology	Agricultural & Environmental Sciences	Session IV (1:50-3:30 pm)	4
<b>Lambert</b>	Josh	Biology	Biological & Biochemical Sciences	Session IV (1:50-3:30 pm)	36

<b>Lee</b>	Katherine	Immunology and Medical Microbiology	Health Sciences	Session III (12:00-1:40 pm)	53
<b>Leon</b>	Jocelin	strategic communications	Behavioral & Social Sciences	Session IV (1:50-3:30 pm)	29
<b>Lilly</b>	Charlotte	Geology	Agricultural & Environmental Sciences	Session IV (1:50-3:30 pm)	5
<b>Link</b>	Jessica	Biology	Biological & Biochemical Sciences	Session III (12:00-1:40 pm)	46
<b>MacFarland</b>	Eva	Psychology & Biology	Behavioral & Social Sciences	Session IV (1:50-3:30 pm)	18
<b>Magee</b>	Lauren	Occupational Therapy	Health Sciences	Session IV (1:50-3:30 pm)	53
<b>Malik</b>	Noor	Biochemistry	Health Sciences	Session IV (1:50-3:30 pm)	57
<b>Malkowski</b>	Aaron	Immunology and Medical Microbiology	Health Sciences	Session III (12:00-1:40 pm)	54
<b>Malone</b>	Jackson	Mechanical Engineering	Health Sciences	Session III (12:00-1:40 pm)	55
<b>Mancini</b>	Daniel	CS/CpE dual major	Physical Sciences & Engineering	Session III (12:00-1:40 pm)	74
<b>Manivannan</b>	Nila	Biochemistry, Psychology	Biological & Biochemical Sciences	Session III (12:00-1:40 pm)	47
<b>Manivannan</b>	Nila	Biochemistry, Psychology	Behavioral & Social Sciences	Session IV (1:50-3:30 pm)	19
<b>Marple</b>	Emily	Animal and Nutritional sciences	Health Sciences	Session III (12:00-1:40 pm)	49
<b>May</b>	Laura	Biology	Biological & Biochemical Sciences	Session III (12:00-1:40 pm)	41
<b>Mayo</b>	Chase	Business	Human Engagement	Session IV (1:50-3:30 pm)	69
<b>McCabe</b>	Liam	Psychology	Behavioral & Social Sciences	Session IV (1:50-3:30 pm)	20
<b>McGhee</b>	Lilith	Exercise Physiology: Pre- Health Professions	Health Sciences	Session III (12:00-1:40 pm)	60
<b>McGoldrick</b>	Liam	Electrical Engineering	Physical Sciences & Engineering	Session III (12:00-1:40 pm)	89
<b>McGrady</b>	Andrew	Geology	Agricultural & Environmental Sciences	Session IV (1:50-3:30 pm)	6
<b>Mendoza</b>	Emma	Psychology	Behavioral & Social Sciences	Session IV (1:50-3:30 pm)	21
<b>Milleson</b>	Virginia	Neuroscience and Psychology	Behavioral & Social Sciences	Session III (12:00-1:40 pm)	18
<b>Morris</b>	De'Anthony	Human Nutrition & Foods	Agricultural & Environmental Sciences	Session III (12:00-1:40 pm)	1
<b>Mountain</b>	Ben	Environmental Geoscience	Agricultural & Environmental Sciences	Session IV (1:50-3:30 pm)	7

<b>Musser</b>	Nathan	Aerospace and Mechanical Engineering	Physical Sciences & Engineering	Session III (12:00-1:40 pm)	90
<b>Naveed</b>	Minahal	Biochemistry	Biological & Biochemical Sciences	Session IV (1:50-3:30 pm)	45
<b>Naylor</b>	Olivia	Exercise Physiology	Health Sciences	Session III (12:00-1:40 pm)	63
<b>Neer</b>	Luis	English	Human Engagement	Session III (12:00-1:40 pm)	73
<b>Nistendirk</b>	Jordan	History & Political Science	Human Engagement	Session IV (1:50-3:30 pm)	66
<b>Nowicki</b>	Grace	Public Health	Health Sciences	Session III (12:00-1:40 pm)	61
<b>O'Brien</b>	Kelly	Strategic Communication	Behavioral & Social Sciences	Session IV (1:50-3:30 pm)	24
<b>Owolabi</b>	Alexander	General Business	Human Engagement	Session III (12:00-1:40 pm)	65
<b>Paesano</b>	Alysia	Occupational Therapy	Health Sciences	Session IV (1:50-3:30 pm)	48
<b>Palomo</b>	Tabatha	Philosophy	Health Sciences	Session IV (1:50-3:30 pm)	49
<b>Pinion</b>	Cassidy	Exercise Physiology	Health Sciences	Session IV (1:50-3:30 pm)	61
<b>Piper</b>	Madeline	Biology	Biological & Biochemical Sciences	Session IV (1:50-3:30 pm)	37
<b>Plante</b>	Molly	History	Human Engagement	Session IV (1:50-3:30 pm)	72
<b>Platz</b>	Jude	Environmental and Natural Resource Economics	Agricultural & Environmental Sciences	Session III (12:00-1:40 pm)	3
<b>Pueschel</b>	Alexander	Biomedical Engineering	Physical Sciences & Engineering	Session IV (1:50-3:30 pm)	77
<b>Quimby</b>	Danielle	Public Health	Human Engagement	Session IV (1:50-3:30 pm)	68
<b>Rawson</b>	Travis	Immunology and Medical Microbiology	Health Sciences	Session III (12:00-1:40 pm)	56
<b>Raymond</b>	Dominic	Interdisciplinary Studies	Behavioral & Social Sciences	Session III (12:00-1:40 pm)	20
<b>Reese</b>	Lindsay	Exercise Physiology	Health Sciences	Session IV (1:50-3:30 pm)	63
<b>Riffe</b>	Rachel	Biology	Biological & Biochemical Sciences	Session IV (1:50-3:30 pm)	38
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## ORAL INDEX

### Human Engagement Category (April 12 5-7:10 pm, Blackwater Room)

Oral 1 (5:00-5:20 pm)	Why the South Carolina Negro Code of 1740 Matters in 2019	Musicology
Oral 2 (5:20-5:40 pm)	Engaging the Twittersphere: Analyzing Hashtags and Engagement Rates on Social Media Networks	Communications/Journalism
Oral 3 (5:40-6:00 pm)	Palliative Care Coaching for Family Caregivers & Patients with Rare Advanced Lung Disease	Nursing
Oral 4 (6:10-6:30 pm)	Engaging differences in HSTA Alumni with differing backgrounds	Social Work & Human Services

### Science & Technology Category (April 12 5-7:10 pm, Greenbrier Room)

Oral 6 (5:00-5:20 pm)	Antagonism of Naturally Occurring Bacterial Isolates <i>Against Staphylococcus aureus</i> : A Search for Novel Probiotics	Biology
Oral 7 (5:20-5:40 pm)	Ischemia Induces Cathepsin L Secretion in Cerebrovascular Endothelial Cells	Neuroscience
Oral 8 (5:40-6:00 pm)	Bio Geotechnical Engineering	Engineering

## ORAL ABSTRACTS

### Human Engagement

#### Oral #1

Why the South Carolina Negro Code of 1740 Matters in 2019

**Kayla Tokar\***

*School of Music, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Music/Music Therapy, Musicology (Creative Arts)

**Student's Major:** Music

White colonists and legislators invariably either exploited or prohibited slave music in Colonial America. Though music scholars generally recognize that whites created a systematic erasure and appropriation of African (and later African American) music in America, European Americans and their descendants have done little to take ownership over their explicit and implicit role in this marginalization. Using the passage of South Carolina's 1740 Negro Code, a law that forbid slaves from playing or owning drums, as a case study, I will discuss the rationalization behind and the effects of the restriction of slave culture and particularly slave music. White colonists' manipulation and prohibition of slave music meant that slaves could no longer use music as a form of self-expression, personal entertainment, or social interaction. These impositions on slaves' cultural expression have created long-standing effects in African American music, which have been discussed primarily by African American scholars. Today, it is paramount not only to discuss the impacts resulting from the oppression of white colonists in this time, but also for the descendants of European Americans to recognize and take ownership of their ties to the same oppression throughout African American music history.

**Funding:** Federal Work Study

**Program/mechanism supporting research/creative efforts:** WVU's SURE Program and WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course.

## **Oral #2**

Engaging the Twittersphere: Analyzing Hashtags and Engagement Rates on Social Media Networks

**Anne Parker\* and Jennifer Harker**

*Reed College of Media, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Communications/Journalism (Social Sciences)

**Student's Major:** Strategic Communications – Public Relations

There are infinite ways to define engagement in the sense of social media networks and using those metrics to analyze posts for market research can provide invaluable insights into what and when you should be posting, especially for professionals in the technology and information industry. This study addresses the power of engagement on social media platforms, specifically Twitter, by measuring variables such as the use of hashtags, the type of content attached to a post, what time it's posted and marketing strategies like live-tweeting events with an assigned hashtag. To go about studying these subjects, the Twitter data of one tech company, its partners, competitors, and similar organizations in its locality were analyzed for the past six months. The aforementioned data, which included 6,022 tweets from eight companies, was compared by factors such as the relationship of word pairs surrounding key hashtags, dates and times of tweets posted, the type of content included in a post, and specific blocks of tweets posted during known events against each post's engagement rates and established KPIs. Not only did the use of designated hashtags during conference-style events show higher interaction rates than non-associated hash-tagged posts, but the type of content that's included in a tweet affects the overall engagement rates of an enterprises' post. Finally, a network analysis sociogram was created to illustrate the key hashtags within the technology industry that garnered the highest engagement. Professionals can use these research findings to better communicate with and engage current and potential clients.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU Work Study

## **Oral #3**

Palliative Care Coaching for Family Caregivers & Patients with Rare Advanced Lung Disease

**Karissa Keech\* and Ubolrat Piamjariyakul**

*School of Nursing, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Nursing and Public Health (Health Sciences)

**Student's Major:** Nursing

Nearly 15 million Americans and greater than 10% of West Virginians live with and eventually die from Rare and Advanced Lung Diseases (R-ALD). The purpose of the study is to pilot test the FamPALcare nursing care intervention with patients and family members managing home supportive end-of-life and palliative care (EOLPC) for R-ALD. The principal investigator hypothesizes that the Intervention group R-ALD patients will have improved management of their severe breathlessness, anxiety and depression compared to control. Intervention family caregivers will show improved psychological outcomes of their depression, home burden, confidence and preparedness compared to control. Intervention group patients will report increased numbers of decisions for EOLPC options for R-ALD and have an increased number of signed directives compared to control. Using random assignment, participants (n=20) will be divided into an intervention and control group. Intervention group will receive FamPALcare while the control group will receive the standard hospital care routine. Inclusion principles for the participants are that participants must be at least 18 and have R-ALD. Exclusion principles are participants who have received or are waiting on a lung transplant or those who have another terminal illness. Results are still undetermined currently.

**Funding:** Other (WVCTSI)

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



#### **Oral #4**

Engaging differences in HSTA Alumni with differing backgrounds

**Kaitlyn Brown\***

*Health Sciences & Technology Academy, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Social Work & Human Services (Social Science)

**Student's Major:** Exercise Physiology

We as people come from different backgrounds and aren't necessarily exposed to other backgrounds until given the chance to. The purpose of this study is to take HSTA (Health Science and Technology) alumni data that has been conducted and compare the data and how the students engage in different backgrounds because they were exposed to them in different settings; at their HSTA club, HSTA symposium, and/or HSTA summer camps. These backgrounds can be different due to race, gender, education background, and economic status. HSTA is a High School program that pick students at random based on their gpa and personal background. It was first created to increase the percentage of African American in STEM fields. They started adding more participants from different backgrounds to have more involvement. The study should show that there will be a significance between the students and the different settings they were exposed to while they were in HSTA. Since this is a ongoing project the results are inconclusive at this time.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

#### **Science & Technology**

#### **Oral #6**

Antagonism of Naturally Occurring Bacterial Isolates Against *Staphylococcus aureus*: A Search for Novel Probiotics

**Brittan McClain\* and Matthew Williams**

Leonard C. Nelson College of Engineering and Sciences, West Virginia University Institute of Technology, Beckley, WV 25801

**Field (Broad Category):** Biology (Sciences)

**Student's Major:** Biology

*Staphylococcus aureus* is an opportunistic pathogen that naturally colonizes around 30% of healthy individuals. Around 1.2 million people contract *S. aureus* infections each year and as many as 119,000 of these infections result in death of the patient. *S. aureus* acquires or evolves antibiotic resistance very quickly, which makes this pathogen extremely difficult to treat in both clinical and environmental settings. Probiotic bacteria are organisms that antagonize, or inhibit the growth, of pathogenic bacteria. The present study looks at the antagonistic effects of three naturally occurring gram-positive bacterial isolates, temporally named BM3, BM4, and BM6, against *Staphylococcus aureus*. These bacterial isolates have shown promising antagonistic effects through immediate antagonism assays on trypticase soy agar, and through 24- and 48-hour antagonism assays on trypticase soy agar and brain heart infusion agar. Further characterization and identification efforts are currently underway for these isolates. These novel bacteria have the potential to be used as probiotics to help combat and prevent community-acquired and nosocomial *S. aureus* infections.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** a WVU 497-level course

### **Oral #7**

Ischemia Induces *Cathepsin L* Secretion in Cerebrovascular Endothelial Cells

**David Tincher\***, Emily Hone, James Simpkins and Xuefang Ren  
*Rockefeller Neuroscience Institute*

**Field (Broad Category):** Neuroscience (Sciences)

**Student's Major:** Immunology and Medical Microbiology

Stroke is a leading cause of both death and impairment worldwide. The Blood Brain Barrier (BBB) is opened during ischemia, and *Cathepsin L* (a protease) is activated in stroke brains. However, it is unknown which type of cells is responsible for the activation of this protease. The goal of this experiment is to investigate whether *Cathepsin L* activity is generated during ischemia in Cerebrovascular Endothelial Cells (CEC). CECs (bEND.3 cell line) in passages 25-30 were cultured in a 175 cm<sup>2</sup> flask and passaged in 24 well plates. The cells were placed in glucose deprivation medium, then cultured in a hypoxia ischemia (HI) chamber for 3 or 6 hours. Entire proteins were extracted from the cells via cell lysis buffer. *Cathepsin L* activity was then evaluated with *Cathepsin L* activity kit from Abcam. The data were then recorded via a plate reader and analyzed by Student's *t* test. *Cathepsin L* activity decreased in the cells however increased in supernatant from CECs at 3 and 6 hours post ischemia in vitro. Secretion of *Cathepsin L* is found in supernatant of CEC's in oxygen glucose deprivation conditions. This indicates that HI activated *Cathepsin L* in CECs. This data also suggests that CEC is a source of *Cathepsin L* in ischemia. Further experiments on varying types of cells are to be studied for *Cathepsin L* activity.

**Funding:** Private (American Heart Association Scientist Development Grant, WVCTSI pilot grant)

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

### **Oral #8**

Bio Geotechnical Engineering

**Roberto Martinez\***  
*West Virginia University Institute of Technology*

**Field (Broad Category):** Engineering

**Student's Major:** Civil Engineering

Bio Geotechnical Engineering refers to different methods and ways of achieving activities directly related to geotechnical engineering work such as soil improvement, soil stabilization, excavations, etc. The main factor that distinguishes bio geotechnical engineering is the understanding of natural and biological changes in the earth, so the engineers can mimic them to improve the ways of geotechnical activities without applying mechanical machines, therefore to save money and to improve in the care of the environment. Some of the applications relate directly to soil improvement using natural methods that will help with soil strength, stiffness, and permeability. One can play with these methods according to whatever is needed on the project site. These bio mediated methods for soil improvement can cause prevention of liquefaction and landslides. Soil improvement is achieved by causing a biochemical reaction that will cause the soil to change its properties by adding calcium carbonate to the soil matrix. This process is also known as Microbial-induced Calcite Precipitation (MCIP). Currently, MCIP is being taken into consideration for further use for many soil improvement applications. However, MCIP needs to further research and field tests since inducing biochemical calcites in the soil which can seep through the soil causing further environment damages. The Arizona State University along with the University of California at Davis, Georgia Institute of Technology, and New Mexico State University have developed a very important research site called the National Science Foundation Engineering Research since 2015.

**Funding:** Private

**Program/mechanism supporting research/creative efforts:** a WVU 497-level course

## POSTER INDEX

### Agricultural & Environmental Sciences Category (Session III: April 13 12:00-1:40 pm)

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<b>Poster 2</b>	Characterization of Yeast and Bacteria on Cider Apples in West Virginia	Agriculture
<b>Poster 3</b>	Creating a Data Analyzing Tool to Simplify Interpretations of Water Quality for Small-Scale Environmental Groups	Environmental Science & Sustainability
<b>Poster 4</b>	The Continued Agriculture Practice and its Impacts on the Nitrogen Cycle	Environmental Science & Sustainability (Microbiology)
<b>Poster 5</b>	Early Spring Green up and Urbanization Effects on Migratory Song Bird Demography	Environmental Science & Sustainability
<b>Poster 6</b>	Dabbling Duck Abundance of Actively and Passively Managed Wetlands during Spring Migration	Natural Resources/Wood Science/Plant Science
<b>Poster 7</b>	The Impacts of Policies and Investments on the Transition to Renewable Energy	Natural Resources/Wood Science/Plant Science
<b>Poster 8</b>	DNA Extraction Methods of Winged Tissue	Natural Resources/Wood Science/Plant Science
<b>Poster 9</b>	Home Range of Song Sparrows Across an Urban - Rural Gradient	Natural Resources/Wood Science/Plant Science
<b>Poster 10</b>	Application of Thermal Treatment to Appalachian Hardwoods to Increase their Physical and Mechanical Properties.	Natural Resources/Wood Science/Plant Science
<b>Poster 11</b>	Southern West Virginia Residents' Perceptions of Water Quality	Wildlife & Fisheries
<b>Poster 12</b>	Connecting Woodland Owners: Giving the Invitee Options to Include Other Concerned Parties Affect Attendance?	Forest Resources Management
<b>Poster 13</b>	Selection of rams for reduced parasite fecal egg count reduces parasite burden in progeny.	Agriculture

### Behavioral & Social Sciences Category (Session III: April 13 12:00-1:40 pm)

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<b>Poster 15</b>	Effect of Socialization versus Structure on Service Dog Training	Canine Behavior
<b>Poster 16</b>	Contextual Interference in Speech Motor Learning Secondary to Similar Phonemes	Physical/Occupational Therapy, Speech Language Pathology & Audiology
<b>Poster 17</b>	Reed College of Media	Other
<b>Poster 18</b>	See - Do Correspondence in a Pigeon	Psychology
<b>Poster 19</b>	ASD and Its Effect on Temporal Binding Windows	Biology
<b>Poster 20</b>	Opioid addiction recovery augmentation via physiologically-based interventions	Neuroscience
<b>Poster 21</b>	Analysis of Optics Tutorial Manual	Physics & Astronomy
<b>Poster 22</b>	The Cannabinoid Drug ZCZ011 Does not Alter Anxiety or Reward in Mice	Psychology
<b>Poster 23</b>	Cultural perceptions of cancer among a college-educated population in north central West Virginia	Anthropology & Archeology
<b>Poster 24</b>	Partisan Outrage? Analyzing US Congressional Tweets following The Parkland Shooting	Communications/Journalism
<b>Poster 25</b>	Cyberguardians	Criminology/Criminal Justice

<b>Poster 26</b>	Crime Witnessing and Guardianship	Criminology/Criminal Justice
<b>Poster 27</b>	The Effect of Mentorship on Women's Self-Efficacy	Educational Psychology
<b>Poster 28</b>	The XFL: A Female's Perspective	Gender Studies (Sports)
<b>Poster 29</b>	How Do Sports Teams Gain A Following?	Sports Media
<b>Poster 30</b>	Overall Fan Sentiment Towards the Atlanta Legends Offering a Woman a Full-time Coaching Position	Sports Marketing
<b>Poster 31</b>	Child Labor on Farms in Appalachia	Anthropology & Archeology

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### Biological & Biochemical Sciences Category (Session III: April 13 12:00-1:40 pm)

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<b>Poster 33</b>	Functional analysis of a flavin monooxygenase gene involved in synthesis of lysergic acid amides	Biochemistry
<b>Poster 34</b>	Assessing Protein Quality and Safety of Silver Carp-Derived Protein Sources Using Growing Rat Model	Human Nutrition and Foods
<b>Poster 35</b>	Characterization of the Terpene Synthase Gene Family in Black Raspberry ( <i>Rubus occidentalis</i> )	Horticulture
<b>Poster 36</b>	Identifying the relationship between <i>Ambystoma maculatum</i> density and genetic shedding using Environmental DNA	Genetics, Conservation Biology, Wildlife
<b>Poster 37</b>	Comparison of Case Report Quality Among Otolaryngology Journals	Medical Sciences
<b>Poster 38</b>	A Role for Extracellular-Vesicles as Potential Mediators of Epigenetic Silencing in Septic Shock Patients	Medical Sciences (Molecular Biology)
<b>Poster 39</b>	Neutrophil Traps as a Mechanism Behind Thrombosis in Cancer Associated Hypercoagulability	Medical Sciences
<b>Poster 40</b>	Daily Rhythms in BBB Permeability Alter Efficacy of Chemotherapy in a Brain Metastases Model	Neuroscience
<b>Poster 41</b>	Social Enrichment Attenuates Chemotherapy Induced Neuroinflammation and Affective Behavior Via Oxytocin Signaling	Neuroscience
<b>Poster 42</b>	Determination of regulatory relationship between FIGLA and the <i>Bos taurus</i> zinc finger protein, ZNFO	Biochemistry
<b>Poster 43</b>	Investigation of ribozyme and protein assisted splicing of an unusual hybrid group IIE intron	Biochemistry
<b>Poster 44</b>	Feeding Rats Different Sources of Omega-3 Polyunsaturated Fatty Acids Altered Liver-Adipose Lipogenic Gene Expression	Biochemistry
<b>Poster 45</b>	The Effect of Small Molecules on Aggregation of Huntingtin in the Presence of Lipids	Biochemistry
<b>Poster 46</b>	Musashi proteins effect gene splicing in photoreceptors	Biochemistry
<b>Poster 47</b>	Analysis of a Mutation in Human CK2 Associated with Developmental Defects in 'Okur-Chung's Neuropathy'	Biology

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### Health Sciences Category (Session III: April 13 12:00-1:40 pm)

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<b>Poster 49</b>	Emergency Department Visits by Pediatrics Patients for Snakebites	Environmental Science & Sustainability
<b>Poster 50</b>	Mitochondrial Non-Coding RNA Import through the KH and S1 Domains of Polynucleotide Phosphorylase (PNPase)	Exercise Science & Nutrition
<b>Poster 51</b>	Exercise Physiology Experiential Learning Improves Self-Efficacy in Undergraduate Students	Exercise Science & Nutrition

<b>Poster 52</b>	Study of Antigenic Peptides in <i>Pseudomonas aeruginosa</i>	Medical Sciences
<b>Poster 53</b>	Development of a Monocyte-specific, Fluorescent-tagged Mouse Strain to Investigate Monocyte Pathogenicity Post Ischemic Stroke	Medical Sciences (Immunology)
<b>Poster 54</b>	Optimizing Protocols for the Development of Polyclonal Antibody Treatments Against <i>Pseudomonas aeruginosa</i>	Medical Sciences
<b>Poster 55</b>	Validation of biomechanical tools for assessment of locomotion	Medical Sciences
<b>Poster 56</b>	The Chemotactic Potential of Myeloid Derived Suppressor Cells during Murine Neonatal Sepsis	Medical Sciences (Immunology)
<b>Poster 57</b>	Lung Inflammation After Carbon Black and Ozone Inhalation Exposure	Medical Sciences
<b>Poster 58</b>	Changes in Myeloid-Derived Suppressor Cell function during neonatal sepsis	Medical Sciences
<b>Poster 59</b>	Alzheimer's disease infected mouse models exhibit a decrease in cognitive abilities after sepsis infection	Neuroscience
<b>Poster 60</b>	Opioid Addiction Recovery Augmentation: Physiologically-Based Interventions	Neuroscience
<b>Poster 61</b>	Assessing the Prevalence of Cardiovascular Risks Among West Virginia Children with Health Conditions	Nursing & Public Health
<b>Poster 62</b>	Evaluation of a Guided Imagery Mobile Health Application for Pregnant Women	Public Health
<b>Poster 63</b>	Mixed Methods Evaluation of Freshman Transfers Out of Exercise Physiology	Exercise Physiology

#### **Human Engagement Category (Session III: April 13 12:00-1:40 pm)**

<b>Poster 64</b>	Incorporating the Great Wolf Lodge into West Virginia	Business
<b>Poster 65</b>	Piercing the Corporate Vail	Law & Legal Studies
<b>Poster 66</b>	Airline Dissolution	Finance
<b>Poster 67</b>	Perceived Advantages to Inclusive Programming in Music Therapy	Music/Music Therapy
<b>Poster 68</b>	Peer Feedback on Revisions & Implementation	Education (Psychology)
<b>Poster 69</b>	Twitter Users and the Translation of Online Communication into Real Life Discourse	English & Literature
<b>Poster 70</b>	Italian American Women and Coal Miners in Denise Giardina's <i>Storming Heaven</i> and <i>The Unquiet Earth</i>	English & Literature
<b>Poster 71</b>	The Editing Process of Postmedieval	English & Literature
<b>Poster 72</b>	Perspectives on the Benefits of Commonplace Books in the 21st Century Classroom	English & Literature (Composition and Rhetoric)
<b>Poster 73</b>	Denise Giardina, Italian American Alienation in Appalachia, Experimental Writing, and Spatial Meaning	English & Literature (Italian American Studies, Appalachian Studies)

#### **Physical Sciences & Engineering Category (Session III: April 13 12:00-1:40 pm)**

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<b>Poster 75</b>	Problem Solving Skills in Freshman Engineering Students Enrolled in College Algebra	Education
<b>Poster 76</b>	The Development and Integration of Air-Brake Systems on a Small-Scale Rocket	Engineering
<b>Poster 77</b>	The Determination of the Burn Rate Characteristics of a Solid Rocket Propellant	Engineering
<b>Poster 78</b>	Deficiencies in Math Knowledge in ENGR Students Enrolled in College Algebra	Engineering

<b>Poster 79</b>	How Acid Mine Drainage Affects Water Quality	Engineering (Civil & Environmental)
<b>Poster 80</b>	The Weather Machine with Arduino	Engineering (Mechanical)
<b>Poster 81</b>	Tethered Drones for Extended Mission Time	Engineering
<b>Poster 82</b>	Conductivity of BZCYb Protonic Ceramic Fuel Cell Materials	Engineering
<b>Poster 83</b>	Smart Manufacturing with Augmented Reality Technology	Engineering
<b>Poster 84</b>	Reviewed Vicon Error Analysis	Engineering
<b>Poster 85</b>	Fabrication of Kirigami based structures for flexible electronics applications	Engineering
<b>Poster 86</b>	Subsurface modeling and well configuration design for deep direct-use geothermal development at WVU	Engineering
<b>Poster 87</b>	Development of an Inexpensive Torque-Limiting Package for Hobby-Grade servos	Engineering
<b>Poster 88</b>	Autonomous Quadrotor Hardware Testing	Engineering
<b>Poster 89</b>	Improving Accuracy of Automatic Neuronal Tissue Segmentation	Engineering (Computer Vision)
<b>Poster 90</b>	Compiling Previous UAS Data to Predict Future Implications	Engineering

#### **Agricultural & Environmental Sciences Category (Session IV: April 13 1:50-3:30 pm)**

<b>Poster 1</b>	Lipid Modification of Hedgehog Protein and its Significance in Polyphenic Development of Beetle Horns	Biology (Genetics)
<b>Poster 2</b>	Looking Inside WVU's Local Volcano: X-Ray Imaging of the Masontown Kimberlite	Geography/Geology
<b>Poster 3</b>	Urban Legacies: Linking Glass Manufacturing to Soil Pollution in Morgantown, WV	Geography/Geology
<b>Poster 4</b>	Deconstructing and Reconstructing Volcanic Layering to Understand How Coring Techniques Disturb Stratigraphy	Geography/Geology
<b>Poster 5</b>	How Did the Fraser River Basin Respond to Reversal: A Terrain Analysis	Geography/Geology
<b>Poster 6</b>	Geospatial Analysis of Heavy Metal Concentrations of Beaumont Glass Factory in Morgantown, WV	Geography/Geology
<b>Poster 7</b>	Topographic effects on Tree Size and Species in Central WV	Geography/Geology
<b>Poster 8</b>	The Distribution and Concentration of Heavy Metal Contaminants among Public Playgrounds in Morgantown, WV	Geography/Geology
<b>Poster 9</b>	Geochemical Mapping of Soil Contaminants in Reedsville, WV	Geography/Geology
<b>Poster 10</b>	Water Monitoring within an Urban Watershed: West Run's Steam of Many Colors, Morgantown, WV	Geography/Geology
<b>Poster 11</b>	How long do Mississippi River fishes live?	Natural Resources/Wood Science/Plant Science
<b>Poster 12</b>	Use of Conspecific Stimuli to Increase Loggerhead Shrike detection	Avian Conservation and Behavior

#### **Behavioral & Social Sciences Category (Session IV: April 13 1:50-3:30 pm)**

<b>Poster 14</b>	Readability and Research Impact	Other
<b>Poster 15</b>	Effect of Manner of Articulation on Different Types of Variance During Speech Motor Learning	Physical/Occupational Therapy, Speech Language Pathology & Audiology
<b>Poster 16</b>	Quality over Quantity: Positive Relationship with Older Adults is Associated with Less Ageism	Psychology

<b>Poster 17</b>	Personality Traits as Predictors of Alcohol Consumption During the First Year of College	Psychology
<b>Poster 18</b>	Racial Prejudice on College Campuses: The Role of Social Integration and Intergroup Contact	Psychology
<b>Poster 19</b>	Strange Situation Procedure Vs. Attachment Q-Sort Measures in Determining Attachment Security in Toddlerhood	Psychology
<b>Poster 20</b>	Adolescents' Pursuit of Well-Being in relation to Substance Abuse and Life Satisfaction	Psychology
<b>Poster 21</b>	Teen Life Project: Social Media Use and Happiness among High School Students	Psychology
<b>Poster 22</b>	Understanding the Association between Political Identity and Immigration Attitudes	Psychology
<b>Poster 23</b>	Personality Traits Predict Change in Depression and Stress Levels During the Transition to College	Psychology
<b>Poster 24</b>	The Relationship Between Stigma and Opioid Use Disorder	Social Work & Human Services (Public Health)
<b>Poster 25</b>	The Study of Social, Behavioral, and Health Problems in Different Generations	Social Work & Human Services
<b>Poster 26</b>	Differences in Online Professional Development Among Graduate Students	Sociology
<b>Poster 27</b>	Various Attitudes Towards the Orlando Apollos	Business
<b>Poster 28</b>	New San Antonio Sports Team Challenges Fan Loyalty in Texas	Communications/Journalism
<b>Poster 29</b>	Football Being Reinvented- How Many People Willing to Watch?	Strategic Communications
<b>Poster 30</b>	Effects of Treatment Integrity Commission Errors on Noncontingent Reinforcement	Psychology
<b>Poster 31</b>	A Pilot Test of a Collaborative Online International Learning Framework in Kinesiology Classrooms	Sports Management/Sport Exercise Psychology

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**Biological & Biochemical Sciences Category (Session IV: April 13 1:50-3:30 pm)**

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<b>Poster 32</b>	NMNAT1, a Protein Associated with Blinding Disease, is Crucial for Retinal Development and Stability	Biochemistry
<b>Poster 33</b>	Yeast Atlas, phenotypic diversity of wild yeast from North and South American regions	Biology
<b>Poster 34</b>	A Hypermorphic Allele Encoding the Ragulator Ortholog Overstimulates Torc1	Biology
<b>Poster 35</b>	Characterizing the onset and extent of aberrant swimming behavior in <i>gsx1</i> mutant zebrafish	Biology
<b>Poster 36</b>	Hybridization in <i>Rhus ovata</i> and <i>R. integrifolia</i> ( <i>Anacardiaceae</i> ) Using Molecules and Morphology	Biology
<b>Poster 37</b>	Reciprocal Regulation of Doublesex and Hedgehog Pathway in <i>O. Taurus</i> Horn Development	Biology
<b>Poster 38</b>	Studying Development of the Hypothalamus in genomic screen homeobox 1 Mutant Zebrafish	Biology
<b>Poster 39</b>	Analysis of a mutation in protein kinase CK2 underlying 'Okur-Chung's Neuropathy'	Biology
<b>Poster 40</b>	Integrative species delimitation in Californian striped coralroot orchids	Biology
<b>Poster 41</b>	The Genetic Underpinnings of Symbiosis Between the Ambrosia Beetle <i>Euwallacea Validus</i> and <i>Fusarium Oligoseptatum</i>	Biology

<b>Poster 42</b>	The Contribution of Serotonin in the Olfactory System to the Circadian Rhythm	Neuroscience
<b>Poster 43</b>	Mapping Histamine Gated Chloride Channels within the Neurons of the Fruit Fly ( <i>Drosophila Melanogaster</i> )	Neuroscience
<b>Poster 44</b>	Mobile Brain-Computer Interface using CCA space partitioning and Heuristic Target SSVEP Identification	Neuroscience
<b>Poster 45</b>	Feeding Rats Diets with Apple Pomace Altered Lipid Metabolism in Non-Alcoholic Fatty Liver Disease	Animal Nutrition
<b>Poster 46</b>	Loss of Brca2 in Bone Marrow Microenvironment Compromises Hematopoietic Stem Cell Function in Mice	Pharmaceutical Sciences
<b>Poster 47</b>	Challenges and Perceptions of Recruiting Patients for Addiction Research Project	Pharmaceutical Sciences

#### Health Sciences Category (Session IV: April 13 1:50-3:30 pm)

<b>Poster 48</b>	Health Narrative of Patients Receiving Palliative Care: A Secondary Analysis	Occupational Therapy
<b>Poster 49</b>	An Analysis of Medical Terminology and Defiant Patients	Medical Humanities and Health Studies
<b>Poster 50</b>	Generation of a Lentivirus-based Vector to Elucidate the Role of IRF4 in Monocyte Differentiation	Immunology
<b>Poster 51</b>	Taking on Metastatic Cancer	Pharmaceutical Sciences
<b>Poster 52</b>	Tobacco Sales: Student Pharmacist Views	Pharmaceutical Sciences
<b>Poster 53</b>	Attitudes, Beliefs, and Behaviors of Occupational Therapists Regarding Marijuana Use	Physical/Occupational Therapy, Speech Language Pathology & Audiology
<b>Poster 54</b>	Experimental Drug to Stop the Spread of HNSCC	Biochemistry
<b>Poster 55</b>	The Role of Mitochondrial Transcription Factor A in Retinal Metabolism and Viability	Biochemistry
<b>Poster 56</b>	Data Mining for Mitochondrial Proline Transporters	Biochemistry
<b>Poster 57</b>	Comorbidity of Peripheral Viral Infections and Diabetes in Etiology of Alzheimer's Disease	Neuroscience
<b>Poster 58</b>	Development of Virtual Reality Tools for Stroke Patient Rehabilitation	Neuroscience
<b>Poster 59</b>	Sigma-1 Receptor Modulation of Mitochondrial Structure, Function and Movement in Transgenic Alzheimer's Diseased Neurons	Physiology
<b>Poster 60</b>	Development of Magnetic Resonance Probes for Imaging of Matrix Metalloproteinase in Breast Cancer	Pharmaceutical Sciences
<b>Poster 61</b>	To Stretch or Not to Stretch: A Study Comparing Neural Activity with or without a Pre-Contraction Stretch	Exercise Science & Nutrition
<b>Poster 62</b>	Drug- and Arthritis-induced Suppression of Digging Behavior in Mice	Psychology
<b>Poster 63</b>	Turning on a Split-Belt Treadmill Using Virtual Reality	Engineering

#### Human Engagement Category (Session IV: April 13 1:50-3:30 pm)

<b>Poster 64</b>	"German Measles": German Involvement in the Formation of the Japanese Beer Industry	History
<b>Poster 65</b>	Snapshot of Immigrant Life in Early 20th Century Morgantown	History
<b>Poster 66</b>	Insiders and Outsiders on the Gay Community in Weimar Berlin	History



<b>Poster 67</b>	Let the Storm Rage On: Reevaluating Misconceptions Regarding the Alaska Native Claims Settlement Act	Native American Studies
<b>Poster 68</b>	An Examination of Characteristics of School Based Health Centers in West Virginia	Learning Sciences and Human Development
<b>Poster 69</b>	Reliability and Reproducibility of Coding Systems in Analyzing Congressional Committee Hearings	Political Science
<b>Poster 70</b>	Studying International Criminal Tribunals in Rwanda and Yugoslavia	Law & Legal Studies
<b>Poster 71</b>	Post-Conflict Reconstruction	Political Science
<b>Poster 72</b>	Life in the Face of Death: Children in the Theresienstadt Ghetto	History
<b>Poster 73</b>	Addressing the Lack of Scientific Materials Available to Young Kids in 4-H Groups	Physics & Astronomy
<b>Physical Sciences &amp; Engineering Category (Session IV: April 13 1:50-3:30 pm)</b>		
<b>Poster 74</b>	Methane Watchdog Network	Engineering
<b>Poster 75</b>	Building an Arduino Weather Station	Engineering
<b>Poster 76</b>	The Breakthrough of Rapid DNA Analysis	Forensics (Biometrics)
<b>Poster 77</b>	Temperature Ramp and Reaction Time Variances Affect Size and Chemistry of Manganese Oxide Nanoparticles	Nanoscience
<b>Poster 78</b>	Analysis of Emissions of Bio-diesel Fuel Compared to Original Diesel Fuel	Engines and Emissions
<b>Poster 79</b>	Broadening the Understanding of Selective Microwave Heating on the 1,2-Meisenheimer Rearrangement	Chemistry
<b>Poster 80</b>	Mock Vandalism: A Study of the Transfer and Persistence of Glass, Paint, and Plastic	Forensics
<b>Poster 81</b>	Forensic Footwear Examinations: What Factors Affect an Examiner's Accuracy?	Forensics
<b>Poster 82</b>	Evaluation of Extraction Techniques for Fentanyl and Metabolites in Liver Tissue for Forensic Purposes	Forensics
<b>Poster 83</b>	Spin-Selective Energy Level Modification via the AC Stark Effect in a Quantum Dot	Physics & Astronomy
<b>Poster 84</b>	Carbon Recombination Lines in Galactic HII Regions	Physics & Astronomy
<b>Poster 85</b>	Time Dependence of Pulsars Nulling Fraction	Physics & Astronomy
<b>Poster 86</b>	Molecular Beam Epitaxy of Hexaboride Thin Films Enabled by the Reaction $B_2H_6 + M$ ( $M = Ca, Sr, Ba$ and Lanthanides)	Physics & Astronomy (Materials Science)
<b>Poster 87</b>	Magnetic Properties in Thin Films	Physics & Astronomy
<b>Poster 88</b>	Exploring Post-merger SMBH Evolution	Physics & Astronomy
<b>Poster 89</b>	Exploring Possible Connections Between Short Gamma-Ray Burst Remnants and Fast Radio Bursts	Physics & Astronomy
<b>Poster 90</b>	Affordable Cybersecurity Education Using Cloud Resources	Computer Science
<b>Poster 91</b>	Zero-Net Solar Powered Charging System for Electric Vehicles	Mechanical and Aerospace Engineering

# POSTER ABSTRACTS

## Session III (12-1:40 pm) - Agricultural & Environmental Sciences

### Poster #1

High Pressure Processing of Salmonella Inoculated Shelled Eggs and their Functional Properties

**De'Anthony Morris\*, Jessica Lemley\*, and Jacek Jaczynski**

*Animal and Nutritional Sciences, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Agriculture (Agriculture/Natural Resources)

**Student's Major:** Human Nutrition & Foods

According to the CDC, salmonella causes an estimated 1.2 million illnesses, 23,000 hospitalizations and 450 deaths within the United States each year (CDC, 2018). Therefore, research is Currently, there are a plethora of processes to keep our food safe, but high-pressure processing (HPP) appears to perform particularly well (Muntean et al., 2016). HPP involves applying high pressure in all directions to an object in an aqueous environment. The result is a substance with inactivated proteins, an extended shelf life and proteins kept intact. The purpose of this project is to inactivate a specific strain of salmonella found in eggs through utilization of a high pressure processing system located in Virginia Tech. First, whole liquid eggs will be processed through the system at varying pressures, pulses and time limits to establish an appropriate value for salmonella reduction. Then, these results will be validated and performing a follow up of functionality to determine impacts upon egg characteristics. Currently, the project is within its beginning stages and materials are still being collected. Later in the year, the methodology will be applied.

**Funding:** Other (USDA HATCH)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #2**

Characterization of Yeast and Bacteria on Cider Apples in West Virginia

**Logan Webb,\* April Kessel,\* Michael Gutensohn, and Ember Morrissey**  
*Plant and Soil Sciences, West Virginia University, Morgantown WV, 26506*

**Field (Broad Category):** Agriculture (Agriculture/Natural Resources)

**Student's Major:** Exercise Physiology

Fermented hard cider production has grown by 56% between 2007 and 2015 due to increasing popularity. With new cideries opening in WV, the burgeoning hard cider industry may be a sustainable platform for regional economic development; however, much remains unknown about cider apples and their fermentation. Hard cider apples have a range for flavor profiles including sweet, bittersweet, bittersharp, and sharp based on their levels of polyphenols/tannins (bitterness) and malic acid (sharpness). However, the choice of yeast strain can also influence the taste and alcohol content of ciders. Typically, cideries eliminate all bacteria and yeasts on cider apples and supplement with strains native to wine grape or beer fermentation. This approach fails to leverage the native microbiota of cider apples historically used in natural fermentation that may be specifically adapted for the chemical and structural conditions of cider apples and imbue the cider with favorable properties. Our research aim is to characterize the microbiome of WV hard cider apple varieties. To do this we collected 12 apple varieties, isolated yeast strains and extracted DNA from the fruit surface. Thus far we have successfully isolated > 20 yeast strains and performed PCR on the bacterial 16S rRNA and fungal ITS genes in preparation for sequencing. Understanding the native microbiota of cider apples will help support the burgeoning craft cider industry in Appalachia.

**Funding:** Institutional (West Virginia University)

**Program/mechanism supporting research/creative efforts:**

Other

Reserach and Scholarship Award

**Poster #3**

Creating a Data Analyzing Tool to Simplify Interpretations of Water Quality for Small-Scale Environmental Groups

**Jude Platz\*, Cullen Platz\*, Ashley Tyler\*, and Melissa O'Neal**

*West Virginia Water Research Institute, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Environmental Science & Sustainability (Agriculture/Natural Resources)

**Student's Major:** Environmental and Natural Resource Economics

Water quality data interpretation requires extensive knowledge of chemistry, federal and state regulations, and advanced graphing skills, making it difficult for the average person to comprehend the health of their local waterways. Reports from state and local governments take time to be published and are limited to the locations that the respective governments choose to sample. This project aimed to create a tool that is simple to use and distribute to provide ordinary people the ability to simplify complex river data into a simple report card "grade". To create this report card tool, scholarly articles were analyzed to derive equations for transforming water quality parameter values into a grade and weighting those individual parameter grades into an overall water grade. EPA, WHO, and state regulations were analyzed and compared to obtain information on the ideal and permissible values of certain chemicals in the water. The report card tool was built using Excel to allow for easy distribution and use by volunteer organizations and school systems. Feedback will be collected from the organizations the tool is distributed to in order to gauge its effectiveness in terms of both simplifying water data, and ease of use. If successful, this tool could have further implications on small scale watershed groups, well water users, and students in environmental courses by facilitating easy interpretation of local water quality.

**Funding:** Private (Appalachian Stewardship Foundation)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #4**

The Continued Agriculture Practice and its Impacts on the Nitrogen Cycle

**Afsaneh Sabet\*, Jeth Walkup, and Ember Morrissey**

*South Agricultural Science Building, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Environmental Science & Sustainability (Agriculture/Natural Resources)

**Student's Major:** Biochemistry

As application rate increase, nitrogen use efficiency declines and yield return decreases, leading to higher rates of nitrogen loss, contributing to greater environmental problems. Nitrogen limitations in natural ecosystems leads to tight nitrogen cycling and low potential for loss. However, the excessive concentrations of nitrogen in agricultural soil amplifies the significance of microbially mediated processes like nitrification. In order to develop sustainable agricultural practices, the long-term effects of management practices on the soil microorganisms that perform central roles in the transformation of nitrogen needs to be studied. To study the long-term impacts of compost application and pasture integration in crop rotations, samples were collected from three separate West Virginia University farms throughout the state with different agricultural practices. The samples collected are given nitrogen to simulate fertilization to later extract its DNA and analyze it. As this is still an ongoing research project, any results found are continuously examined. The significance of the results found will show the differences in the farms and how nitrogen is used in the separate farms. By gaining this information, modifications can be made to alter the agricultural practices to lessen the environmental impacts.

**Funding:** Federal (National Institute of Food and Agriculture)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #5**

Early Spring Green up and Urbanization Effects on Migratory Song Bird Demography

**Caleb A. Worley\* and Christopher Rota**

*Davis College of Natural Resources, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Environmental Science & Sustainability (Agriculture/Natural Resources)

**Student's Major:** Wildlife and Fisheries Resources Management

Consistent with the warming climate, birds are starting to shift their migration patterns, but it is unclear to what extent this is happening at. Bird migration is primarily cued by a consistent annual response to the photoperiod. While conditions at bird breeding grounds are dependent on annual variable climate, we are starting to see bird arrival and climate driven spring events diverge. To see how early spring green up is affecting song birds, we performed a mark/re-capture/re-sighting study at the WVU Core Arboretum, in Morgantown, WV. Targeted bird species for this study were; Eastern towhees (*Pipilo erythrophthalmus*), Song sparrows (*Melospiza melodia*), White-throated sparrows (*Zonotrichia albicollis*), Indigo buntings (*Passerina cyanea*), and Northern cardinals (*Cardinalis cardinalis*). Passive and target mist netting techniques were used to capture the birds. After a bird was captured, measurements were taken, and colored leg bands were applied to that bird. After banded birds were released, they would be further studied, by being identified in the field by their color combination and species. With this information we are able to answer questions such as the relative abundance, survivability, reproduction, and home range of certain song bird species in the arboretum. We expect our study to show that birds that are spending the winter in the arboretum will have better demographic rates than those that are migrating here after the spring green up.

**Funding:** Federal (Work Study)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #6**

Dabbling Duck Abundance of Actively and Passively Managed Wetlands during Spring Migration

**Zachary R. Dienes\*, Lindsay A. Leightner\*, Philip C. Gibson\*, Alex J. Murray\*, and Christopher T. Rota**

*Division of Forestry and Natural Resources, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Natural Resources/Wood Science/Plant Science (Agriculture/Natural Resources)

**Student's Major:** Wildlife and Fisheries Resources

Management for migratory waterfowl has been largely focused around wetland management as guided by the North American Waterfowl Management Plan. There are many wetland management programs that provide waterfowl with quality habitat and an abundance of forage. Many of these programs are focused on fall and wintering habitat with few assessments on how these wetlands affect similar waterfowl communities throughout the spring. Our objective was to compare abundance of dabbling ducks between both actively and passively managed wetlands in northeast Ohio and northwest Pennsylvania during the spring migration. We related these differences to variations in available forage between actively and passively managed wetlands. We conducted surveys for dabbling ducks on 8 actively managed wetlands and 11 passively managed wetlands during spring 2018. Following surveys, available forage was sampled and estimated as duck-use-days (DUDs) for 6 actively managed wetlands and 11 passively managed wetlands. We found mallards (*Anas platyrhynchos*) to be observed most often across all wetlands, followed by wood ducks (*Aix sponsa*), and gadwall (*Anas strepera*). Abundance of dabbling ducks was higher on passively managed wetlands ( $p$ -value = 0.018) and increased with wetland size ( $p$ -value < 0.001). Mean DUDs for actively managed wetlands was  $4,582 \pm 1638$  and  $3,262 \pm 846$  for passively managed wetlands, we detected no statistical difference between wetland managements ( $p$ -value = 0.437). Although forage resources were similar between actively and passively managed wetlands, dabbling duck abundance was higher on passively managed wetlands. This suggests factors other than available forage influence dabbling duck abundance in wetlands during spring migration.

**Funding:** Institutional (George A. Myles Natural Resources Undergraduate Student Enhancement Grant)  
**Program/mechanism supporting research/creative efforts:**  
capstone course within my department

**Poster #7**

The Impacts of Policies and Investments on the Transition to Renewable Energy

**Tatianna Evanisko\***

*Division of Resource Economics and Management, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Natural Resources/Wood Science/Plant Science (Agriculture/Natural Resources)

**Student's Major:** Environmental and Natural Resource Economics

This study examines the impacts of policies and investments on the transition to the use of more renewable energy in the first part of the 21st century. Using state-level data, we consider the impact on the transition to renewable energy due to financing, policies, and the energy technologies each state can accommodate. We also control for other factors such as population, income, and employment using data from the U.S. Census and Bureau of Economic Analysis. Yearly energy production data are taken from the U.S. Energy Information Administration and policy and project investment data from the U.S. Department of Agriculture. Our analysis provides insight into the factors that lead to the expansion of renewable energy in yearly output by state, and overall in the United States. No major conclusions can be made because the research is still finishing in development. The abstract presented can be lengthened, however right now it is a descriptive abstract, which is supposed to be more brief. It can become an informative abstract if needed. The research will be completed before the presentation and the abstract can be re-checked and lengthened if pre-approval is needed.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**  
capstone course within my department



**Poster #8**

## DNA Extraction Methods of Winged Tissue

**Rachel K. Honerlaw\* and Amy B. Welsh***A. Welsh Division of Forestry and Natural Resources, West Virginia University, Morgantown, WV, 26505***Field (Broad Category):** Natural Resources/Wood Science/Plant Science (Agriculture/Natural Resources)**Student's Major:** Wildlife and Fisheries Resources

Leucorrhinia glacialis (Crimson-ringed Whiteface dragonfly) and Leucorrhinia hudsonica (Hudsonian Whiteface) samples were collected from across Maryland, Pennsylvania, and West Virginia. Dr. Amy Welsh assessed, analyzed and assisted the procedures and data of this project alongside me. By using Proteinase K and other enzymes to break down the wing tissue of the samples, we are able to extract Deoxyribonucleic Acid (DNA). It took several attempts to break down the wing tissue of the individuals. We researched other scientists' procedures and had several trials. Some consisted of extreme heat while others consisted of freezing the wings first and then breaking the wings before adding the Proteinase K. Bacteria and other impurities are washed out through Buffers and other cleansing washes to isolate the DNA. By using Thermoregulators, proteins (dntp), Pippin Prep, enzymes and lipases to extract the DNA and purify it so analytically we can discover how much DNA the sample contains and assess it accordingly. Once balancing the water to DNA ratio by using the Pippin Prep and Thermoregulators, DNA can be further processed using Polymerase Chain Reaction (PCR). Our interest lies in analyzing the species genome to process and understand how the species coexists and thrives in acidic niches and environments. This study is important because as wildlife biologists aim to improve streams and soil sites by making the pH less acidic, it negatively affects the dragonflies. By looking at their genome, we can better understand why they thrive in more acidic regions.

**Funding:** Not funded**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) &amp; accompanying HONR 297-level course

**Poster #9**

Home Range of Song Sparrows Across an Urban - Rural Gradient

**Alyson M. Scheibe\* and Christopher T. Rota**

*Department of Wildlife & Fisheries Resources, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Natural Resources/Wood Science/Plant Science (Agriculture/Natural Resources)

**Student's Major:** Wildlife & Fisheries Resources

The spatial distribution of a species is largely shaped by resource availability and anthropogenic factors like habitat fragmentation. As urbanization continues to intensify the effects of climate and land-use change the spatial distribution of species is expected to shift as a result. Information regarding how a species is distributed is often used as a fundamental building block to answer wildlife conservation and management problems. To begin to understand the factors contributing to a species' altered spatial distribution we must first understand the home range of individuals within a population over time. An individual's home range refers to the area utilized for shelter, food gathering, and reproduction. Knowledge of variation in home range size provides insight to the underlying ecological processes contributing to altered spatial distribution. In attempt to gain this knowledge Song Sparrows at the Core Arboretum in Morgantown, WV were color banded to give each banded bird an individual identity. Consistent efforts were put forth to re-sight and record GPS coordinates of banded birds. These coordinates were then graphed to depict the home range of individuals and begin to understand the spatial distribution of Song Sparrows in the Core Arboretum. Efforts to analyze these home ranges will continue until adequate data is collected to draw conclusions about spatial distribution.

**Funding:** Institutional (West Virginia University Davis College of Agriculture, Natural Resources and Design)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #10**

Application of Thermal Treatment to Appalachian Hardwoods to Increase their Physical and Mechanical Properties.

**Grant Tennant\*, Connor Crowley\*, Kaushledra Singh, Gloria Oporto, Ben Dawson-Andoh**  
*Davis College Department of Wood Science and Technology, West Virginia University, Morgantown, WV, 26506*

**Field (Broad Category):** Natural Resources/Wood Science/Plant Science (Agriculture/Natural Resources)

**Student's Major:** Forest Resource Management

Yellow poplar (*Liriodendron tulipifera*) is a common hardwood species of the Appalachian Forest. It is relatively fast growing, generally produces straight and tall logs, and is easily identified by its "tulip" shaped leaves. However, until this point its wood has been underutilized mainly because of its inferior physical and mechanical properties compared to other hardwoods. Therefore, this work aims to add commercial value to yellow poplar hardwood for outdoor applications through controlled thermal treatment. Using a simple experimental design, several samples of yellow poplar are exposed to temperatures ranging from 100-200 °C in a nitrogen atmosphere for 2 and 4 hours. Experimental data show that thermal treatments increase resistance to both white rot and brown rot fungi. Thermal treatments conducted for 2 hours at 100 °C exhibit a 13.7% reduction in weight loss vs. control samples inoculated with brown rot and a 17.7% reduction in weight loss vs. control for samples inoculated with white rot. Additionally, increases in compression strength vary from 5% to 12% among our treatment groups. Analysis of absorption rates show that, among samples soaked in water for 1 hour, the samples treated at 200 °C for 4 hours absorb an average of 20% less water than control samples. Overall, the 200 °C treatment absorbs the least amount of water on average, absorbing 14% less than control. In conclusion, experimental data and analysis consistently show a positive correlation between simple thermal treatments and improved physical and mechanical properties as well as improved fungi resistance in yellow poplar.

**Funding:** Federal (Federal Work Study)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #11**

Southern West Virginia Residents' Perceptions of Water Quality

**Maggie Black\*, Mary Allen, and Robert Burns**

*Robert Burns Davis College of Agriculture, Natural Resources & Design, West Virginia University,  
Morgantown, WV 26506*

**Field (Broad Category):** Other (Agriculture/Natural Resources)

**Student's Major:** Wildlife & Fisheries Resources

A combination of social and environmental factors contribute to public perceptions of water quality. These perceptions are diverse and oftentimes context specific. The purpose of this study was to understand stakeholders' opinions on the water quality in West Virginia. More specifically, this study is interested in three main objectives 1) how West Virginia residents perceive water quality in a) the environment and b) in their households, 2) stakeholders' opinions on water pollution and how these perceptions impact their daily lives, and 3) the differences in responses based on regions. To evaluate these perceptions, a survey was sent through the mail to residents in the Southern Region of West Virginia. The survey asked residents about their opinions on the water quality in West Virginia and how it relates to their recreational activities, impacts their daily lives, if they would support regulations to improve water quality, and if they are interested or willing to learn more about water quality issues. The rivers, streams, and lakes in West Virginia are of unknown quality, and this could yield potential health risks to the residents that live close to these bodies of water. This is significant because it's very important that stakeholders have access to clean water for consumption as well as recreation. We hypothesize the residents of West Virginia will perceive their water quality as poor in the environment and in their households. We also hypothesize the stakeholders will have a neutral opinion on water pollution and the effects of it.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #12**

Connecting Woodland Owners: Giving The Invitee Options To Include Other Concerned Parties Affect Attendance?

**Andrew Walter\* and Dave McGill**

*School of Natural Resources, Davis College of Agriculture, Natural Resources and Design, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Other (Agriculture/Natural Resources)

**Student's Major:** Forest Resources Management

Over 75% of woodlands in West Virginia is privately owned. Most know their woodlands have value but are unaware of many aspects of forest management and the complexity of timber sales. Based on past research, we hypothesized that if landowners are given the invitation to bring other guests or invite others to come along with them, then people are more likely to show up to forestry education events. To test this, we set up a "Meet Your Forester" seminar in Upshur County and invited 900 landowners from a three county area using three treatments. We sent the direct mailing in three groups: 1) invitation only (the control group), 2) an informational flyer and return postcard, and 3) a flyer and return postcard with a question about how many people they would be bringing. At the event we had surveys that each person filled out when they walked in the door. The survey asked how each person heard about the event because the local newspaper put ads in the paper, as well as the extension office. Based on low and even numbers, we were not able to substantiate our research hypothesis.

**Funding:** Federal (USDA NIFA Renewable Resources Extension Act)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #13**

Selection of rams for reduced parasite fecal egg count reduces parasite burden in progeny.

**A.B. Farley\*, A. R. Weaver, S.P. Greiner, and S.A. Bowdridge**

*Division of Animal and Nutritional Sciences, West Virginia University, Morgantown, WV 26506;  
Department of Animal and Poultry Sciences, Virginia Tech, Blacksburg, VA 24061*

**Field (Broad Category):** Agriculture (Sciences)

**Student's Major:** Animal and Nutritional Science

Katahdin sheep were developed to be a low-input maternal sheep breed with enhanced disease resistance. *Haemonchus contortus* (Hc) is a gastrointestinal parasite that has become resistant to all drug classes. The objective of this study was to determine the relationship between sire fecal egg count (FEC) EBV on FEC and worm burden in their progeny. A divergent mating scheme was developed whereby exceptionally high (HiFEC) ( $n = 2$ ) or low (LoFEC) ( $n = 2$ ) FEC EBV rams were randomly mated to Katahdin ewes at the Southwest Virginia Agriculture Research and Extension Center. Lambs were born mid-March 2018 and managed as one group. Lambs were weaned in mid-June and transported to the WVU Animal Sciences Farm. Lambs were randomly allocated to four pens with even distribution of sire and sex. All lambs ( $n = 109$ ) were infected with 10,000 Hc L3 and the infection persisted for five weeks. During this time, FEC was collected weekly. At the end of the 5-wk period, a subset of lambs ( $n = 46$ ) from each sire were randomly selected and harvested to obtain abomasum worm counts. Harvest FEC (350 vs. 171 eggs/g;  $P = 0.10$ ) and adult worm count (303 vs. 202 worms;  $P = 0.48$ ) were numerically greater for HiFEC-selected lambs vs. LoFEC-selected lambs. On initial observation, worms from HiFEC-selected lambs had greater egg release than those in LoFEC-selected lambs (0.51 eggs/g/worm vs. 0.15 eggs/g/worm) which led us to conclude that progeny from rams with low FEC EBV have greater resistance to Hc.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

## Session III (12-1:40 pm) – Behavioral & Social Sciences

### Poster #14

Environmental Factors in Agriculture Development

**Noah Cremeans\***

*Agriculture Sciences Building, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Architecture & Interior Design (Agriculture/Natural Resources)

**Student's Major:** Civil Engineering

The goals of this research lab are to investigate and robustly predict the effect that environmental factors such as courtyards, natural light, windows, and the overall ability to see nature change the way someone navigates around an area, in this case a hospital. To assess this, we created two different hospitals within virtual reality. The constant group is tasked within a hospital that has a lack of windows and is only lit by artificial lights. It also does not have any courtyards and feels much grimmer than the other hospital. The experimental group is tasked within the other hospital, which has been built with sky to ceiling windows, several impressive courtyards, and a stronger connection to nature. Participants were recruited via a convenience sample, with a \$20 Amazon gift card as an incentive. The participant gets to review a 2D map of the hospital they will be exploring before going putting on the VR equipment. They cannot look at the map after they begin. They are tasked with finding 5 targets, which are various room numbers scattered around the hospital (Lab 129, Exam 93, etc.). By mapping the route the participant takes, including stops and where they look throughout the experiment, we are able to determine what impact environment has on decision making. The results show that the environment does have an effect on how people making their decisions, suggesting that a closer connection to the environment might have an impact on short term memory and other cognitive functions.

**Funding:** Private (Academy of Architecture for Health Foundation)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #15**

Effect of Socialization versus Structure on Service Dog Training

**Emily Stauffer,\* Savannah Connelly, Jean Meade, Nancy McIntyre, Rachel Marrow,\* and Lindsay Parenti**

*Davis College of Agriculture, Natural Resources and Design*

**Field (Broad Category):** Other (Agriculture/Natural Resources)

**Student's Major:** Animal and Nutritional Sciences

A great deal of time and effort is put into raising and training dogs to become service dogs to help those in need. The purpose of this study is to determine the most effective way to raise service dog puppies by studying the development of eight puppies. Four puppies were raised in a home setting as a pet and did not wear capes or go into public. The other four puppies were placed with student fosters where they were trained in lab one to two hours per week, learned the tasks to be a service dog, and went into public establishments. To test the puppy's development, at 9 weeks and 3, 6, 9 and 12 months of age, the puppies were brought to the WVU Service Dog farm to go through the Match-Up II temperament test. Some of the tests include observing the dog's reaction around a strange women, obedience, and aggression around toys and food. One trend that was evident in the Match-Up II test was that the playfulness of the community dogs was always slightly lower than the student fostered dogs. The importance of this study is that if the optimal rearing conditions can be discovered, then there may be a higher rate of puppies who can become successful service dogs.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Poster #16**

Contextual Interference in Speech Motor Learning Secondary to Similar Phonemes

**Katelyn Bond\* and Kimberly Meigh**

*Department of Communication Sciences and Disorders, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Physical/Occupational Therapy, Speech Language Pathology & Audiology  
(Health Sciences)

**Student's Major:** Speech Pathology and Audiology

**Purpose:** The contextual interference (CI) effect is a motor learning phenomenon where learners experience difficulty during training resulting in poor performance; however, improved performance is observed in transfer conditions. Different variables elicit a CI effect, and the purpose of this study is to investigate whether phoneme (or sound) similarity may result in a CI effect during speech motor learning. **Method:** The study included twenty-nine participants whose hearing and speech abilities were within the normal range. Participants were randomly assigned to one of two training sessions involving nonwords with either similar or dissimilar phonemes. Each training session included nonword repetition training with feedback, retention task where trained nonwords were repeated without feedback, and a transfer task where novel, untrained nonwords were repeated. Following the first training session, participants initiated the second training session with the opposite set of stimuli. Stimuli assignment was counterbalanced across participants. Current analyses includes perceptually rating accuracy of the nonword productions, as well as measuring acoustic durations of accurately produced nonwords. **Results:** Analysis is still in progress; however, preliminary analyses suggests motor learning may be influenced by the number of similar phonemes present in each nonword. This is suggestive of a CI effect due to phoneme similarity. **Conclusion:** Speech is a unique motor act that includes additional variables that may be used to influence the CI effect (e.g., phoneme similarity). Understanding the CI effect provides insight into the motor learning variables that influence motor performance, which may be used in speech therapy to enhance clinical outcomes.

**Funding:** Other

**Program/mechanism supporting research/creative efforts:**  
a WVU 497-level course

**Poster #17**

Reed College of Media

**Reagan Baehr\*, Carly Stiller, and Joseph Kennedy**  
*261 Willey Street*

**Field (Broad Category):** Other (Other)

**Student's Major:** Strategic Communications

The Alliance of American Football is a new football league launching in the spring. The league hopes to give fans the feel of a regular NFL game, but taking out what fans do not like about the National Football League, while incorporating new factors that fans do want to see. The AAF is exciting because it combines college football athletes with professional athletes from the NFL. Through our research we will explore different perceptions of how people become sports fans and how to incorporate that into this new league. We hope that our research will discover how the AAF will bring fans in initially, what they have to do to keep those fans engaged, and find out exactly which influencers are key in furthering our AAF league, Memphis Express. We will use qualitative, quantitative, and network analysis research methods. Our qualitative research method will be a focus group composed of most likely 3 fans that prefer college football and 3 fans that prefer the NFL. For quantitative, we will do a survey based on a team identification scale that will show what sports fans look for in a sport. Lastly, for our network analysis we will take a user from Twitter and see who is the most influential person when bringing in and engaging fans. We believe that doing these studies will help us understand people's perceptions and attitudes towards making the AAF more popular in the future.

**Funding:** Not funded (West Virginia University)

**Program/mechanism supporting research/creative efforts:**

WVU Work Study (not associated with RAP)

**Poster #18**

See - Do Correspondence in a Pigeon

**Virginia Milleson\* and Kennon Lattal**

*West Virginia University Department of Psychology, Morgantown, WV, 26506*

**Field (Broad Category):** Psychology (Other)

**Student's Major:** Neuroscience and Psychology

This study investigated stimulus control of one pigeon's behavior by that of another pigeon. Three responses of the model pigeon first were trained - stand on a platform, key peck, and nudge a box - in the presence of three different light colors. A second, observer, pigeon was taught, in an adjacent chamber, the same three responses, but not in the presence of the lights. When both pigeons respond appropriately, they will be put in their respective chambers, separated by clear plastic, with the lights visible only to the model. Both pigeons can receive a reinforcer for the response signaled to the model pigeon. The question is whether the model's behavior would serve as discriminative stimulus for the observer's response. Both pigeons are trained on the three responses. When training is complete, with the model's behavior >90% under the control of the lights, we will begin trials to see to if and to what extent the observer pigeon's behavior is controlled by the model's behavior. We will have data on the observational learning tests by the end of March.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

a WVU 497-level course

**Poster #19**

ASD and it's Effect on Temporal Binding Windows

**Jonathan Kingsly\*, Paula Webster\*, and Jim Lewis**

*Erma Byrd Biomedical Center*

**Field (Broad Category):** Biology (Sciences)

**Student's Major:** Biomedical engineering

Autism refers to a broad range of conditions characterized by repetitive behavior, and challenges with social skills, speech and nonverbal communication. Autism cannot be cured and is a chronic disease that usually lasts for a lifetime. Our project primarily focuses on the temporal binding windows of people with autism. Temporal binding window refers to the period of time it takes for different stimuli from different sources to be integrated and perceptually bound. In our lab. we are measuring the TBWs for individuals with autism who are known from prior studies to have wider TBWs. This impacts their ability to integrate sensory inputs, which are critical to the development of language and other skills. Further, most subjects with extremely wide TBWs are often excluded from research studies for a lack of task compliance. We believe that their TBWs are actually wider than what is currently being measured. The purpose of this study is to prove that instead of simply failing to comply with the task, these people's TBWs are just extraordinarily large. Initial literature searches primarily focused on TBWs and ASD. As of now, we are devising a way to process their data so that they can be included in studies, greatly increasing the number of people with ASD who are able to participate in these studies. Afterwards, participants will be recruited to have their TBWs analyzed using MATLAB software. If completed, we would be able to gain a better picture of their true ability to integrate audio and visual cues.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #20**

Opioid addiction recovery augmentation via physiologically-based interventions

**Dominic Raymond\*, Victor Finomore, Zachary Wright, and Lilith McGee**

*Rockefeller Neuroscience Institute, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Neuroscience (Sciences)

**Student's Major:** Interdisciplinary Studies

This study will analyze different physiological triggers that correspond with relapse in patients who suffer from opioid addiction. This data will be collected from wearable physiological trackers (Garmin watches). The participants will also have data collected from a battery of tests administered from an application provided on smart phone devices. This battery will consist of a standardized clinical neuropsychological assessment with a focus on executive function. Tests included are the Wechsler Abbreviated Scale of Intelligence, Trail Making Test, Wisconsin Card Sorting Test, Tower of Hanoi, Stroop Color Word Test, Controlled Oral Word Association Test, Random number generation, Operation Span, Animal Naming Test, and California Verbal Learning Test. The primary aims of this study are to develop predicative models of abstinence and relapse of opioid use disorder participants from daily, "in the wild", collection of physiological, cognitive, and behavioral measures and to document lessons learned on daily, "in the wild" data collection of opioid use disorder participants such as feasibility, research tool selection, compliance, and process.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #21**

Analysis of Optics Tutorial Manual

**Samuel Cyphert\*, and Edward Flagg**

*Department of Physics and Astronomy, West Virginia University, Morgantown, WV, 26505*

**Field (Broad Category):** Physics & Astronomy (Sciences)

**Student's Major:** Aerospace Engineering

The current method for training new students in the optics laboratory is relatively inefficient, as skills are learned in a piece-meal, ad hoc manner. The goal of this project was to create a better learning pathway. A case study was conducted with one individual who had minimal exposure to optics concepts and techniques. The participant was given a tutorial manual developed with instructions for different exercises starting from lower-difficulty techniques and building to higher-difficulty techniques. As the participant progressed through the exercises, they were observed, and the steps and concepts not readily understood were recorded. Any help from an outside source was also documented. This information was all compiled and used as a formative evaluation of the various exercises and their corresponding graphics in order to help further the development of the tutorial manual. The goal of the manual is to give detailed instruction on the various optics skills necessary for optics based laboratory productivity from beginner to advanced techniques.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #22**

The Cannabinoid Drug ZCZ011 Does not Alter Anxiety or Reward in Mice

**Brian Kotson\*, Kristen Trexler, and Steven Kinsey**

*Department of Psychology, West Virginia University, Morgantown, WV, 26506*

**Field (Broad Category):** Psychology (Sciences)

**Student's Major:** Psychology

The main psychoactive component of cannabis,  $\Delta$ 9-tetrahydrocannabinol (THC), binds to and activates the cannabinoid type 1 receptor (CB1). ZCZ011 is a CB1 positive allosteric modulator, meaning it binds to an allosteric site of CB1, rather than the orthosteric site, where THC binds. ZCZ011 amplifies the effects of CB1 agonists without inducing common cannabinoid side effects, such as sedation. The goals of the current study were to (1) characterize acute effects of ZCZ011 in common assays of anxiolytic (i.e., anxiety-reducing) drugs and (2) determine abuse potential using the conditioned place preference paradigm. Separate groups of both male and female mice were used to determine the effects of acute ZCZ011 (2.5-40 mg/kg) administration. ZCZ011 had no effect on anxiety-like behaviors in any of the assays. ZCZ011 (40 mg/kg) caused a statistically significant increase in immobility in the light/dark test and decreased rearing (an exploratory behavior) in the open field test. ZCZ011 had no effect on conditioned place preference, indicating that it lacks rewarding properties. Overall, these results indicate that ZCZ011 does not affect anxiety and has minimal abuse potential. Future studies will evaluate the ability of ZCZ011 to reduce THC withdrawal symptoms in mice.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #23**

Cultural perceptions of cancer among a college-educated population in north central West Virginia

**Jamie E. Billman\*, Susanna Donaldson, and Ann Morris**

*Department of Sociology and Anthropology, West Virginia University, Morgantown, WV, 26505*

**Field (Broad Category):** Anthropology & Archeology (Social Sciences)

**Student's Major:** Anthropology

Through interviewing, this research seeks to find out what college education Appalachians know about cancer, and how they explain or rationalize things for themselves. College educated people were chosen as a target demographic because prior studies have indicated cultural factors may explain above average rates of cancer in West Virginia in low-income, uneducated populations, so further research needed to be done on educated populations. There is a consensus that college educated people understand cancer via a biomedical framework, meaning that how they understand cancer is similar to how medical professionals understand cancer. Using free listing and interviewing methods, questions were administered to interviewees to get at this information. This data collected from the free listing activity is put into free list sheets to understand commonalities between interviewees answers. Seeing where these commonalities are let us know generally what information our interviewees do know and what information they have that does not fit in with the biomedical framework. Finding out where information is lacking may point towards a disconnection between medical professionals' explanatory model of cancer and that of those interviewed, despite generally thinking these two groups view cancer the same way. Medical professionals can then use this information to better distribute information to the general public that will supplement what they already know.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Poster #24**

Partisan Outrage? Analyzing US Congressional Tweets following The Parkland Shooting

**Shianne Ferrell\* and Nicholas Bowman**

*Communication Studies Department, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Communications/Journalism (Social Sciences)

**Student's Major:** Psychology

The popularity of social media is not lost on politicians and public figures, many of whom turn to popular platforms such as Twitter, to share information and dialogue with their constituents. The purpose of this project is to analyze the Twitter accounts of all members of US Congress, and their reactions to the February 14 shooting at Stoneman Douglas High School in Parkland, FL (the "Parkland Shooting"). The Parkland Shooting was the deadliest school shooting in the United States, and took place during a time of increased public awareness and debate about gun control and the Second Amendment. All Congressional tweets from February 14 to February 21 (week following the event) that referenced Parkland, gun control, or related content were collected, resulting in a total of 1,008 tweets (just under three per Congress member). Working with a team of researchers, we are currently analyzing the tweets for correlations between the content of each tweet and the (a) political affiliation of the Congress member and (b) the amount of funding those members receive from various lobbying groups. Preliminary analysis of a small sample of tweets (54 total members) suggests common themes found within the tweets, including expressions of outrage, policy discussions, social support, critique of others, and causes of mass shootings. Ongoing coding and correlation analyses is being conducted to better understand the relationship between political affiliation and Congressional members' reactions to tragic-yet-politicized events. Through our current findings, members with the Democratic affiliation tended to tweet more throughout the week.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #25**

Cyberguardians

**Katherine Spurlin\* and Karen Weiss**

*Department of Sociology, Criminology, and Anthropology, West Virginia University*

**Field (Broad Category):** Criminology/Criminal Justice (Social Sciences)

**Student's Major:** Criminology

An emerging topic in Sociology and Criminology is the study of different forms of crime witnessing. The purpose of this research project is to develop a typology of witness responses to crime, especially as they relate to new digital technologies. Using news articles written on different crimes, we categorize "cyberguardianship" action and outcomes, providing examples of both positive and negative intervention. Using search words for good samaritans, bystanders, crime, and witnessing we examined the media cases that made the most headlines. We are particularly interested in identifying different cases of people who do not intervene and those who record the crimes they witness and post them online. Given the potential of third parties to impact crime outcome, understanding witness behavior is important. Understanding witness behavior in an era of technology is particularly important for criminology research and policy. Analysis from this project will be used to help frame future investigations of guardianship and crime. These investigations will include analyses of legal and ethical issues, situational factors and controversies regarding the Internet.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #26**

Crime Witnessing and Guardianship

**Julie Vogel\* and Karen Weiss**

*Department of Sociology and Anthropology, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Criminology/Criminal Justice (Social Sciences)

**Student's Major:** Criminology

The purpose of this survey study is to collect and gather data from people who have witnessed crimes in order to identify what types of crimes they saw, their reaction to crimes (intervention vs non-intervention), and their opinion of policing in their area. First, we analyzed and deciphered data from a previous survey to ensure that we created survey questions that would produce meaningful data. We formed our research questions based on criminological theory about witness intervention and perceptions of community and policing. We plan to administer the final survey to a representative sample of residents using a snowball sample from social media websites. The survey will gather demographic data from respondents (i.e. race, age, gender, type of community, etc.), information on their experiences with witnessed crime, their reactions to the crimes they witnessed, and additional feedback to help us better understand their responses. Survey findings will help us to identify the types of crime that occur in different types of communities, and determine whether a person's connections to their community influence their willingness to intervene when witnessing a crime. The importance of this study is to learn more about those who witness crime rather than commit it, and to measure the likelihood of someone intervening to help.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #27**

The Effect of Mentorship on Women's Self-Efficacy

**Amal Khan\* and Dr. Paul Hernandez**

*Department of Learning Sciences and Human Development, West Virginia University, Morgantown, WV  
26506*

**Field (Broad Category):** Education (Social Sciences)

**Student's Major:** Psychology

In today's advancing society, careers in science, technology, engineering, and mathematics could not be more important. With the rapid development of new technology and scientific techniques, it is of great importance that the scientific community reflects our diverse society. By having diversity in science, there will also be diversity of thought, which can lead to important new scientific findings. The current study examines how women respond when assigned a mentor in their desired STEM field. Female college freshmen were given the opportunity to work with a professional in fields such as geoscience and chemistry and participated in a professional development workshop. This group was compared and matched with a control group. It was hypothesized that mentorship will be positively correlated with levels of science self-efficacy. A correlational analysis found that there was a small, positive, and statistically significant correlation between combined mentor psychosocial support and instrumental support and self-efficacy,  $r(93) = 0.21$ ,  $p = .04$ . The findings show that when college freshmen and sophomores are given a mentor from the start of their undergraduate studies, they develop a stronger sense of belonging to the field, as compared to women who do not have a mentor. This can lead to higher levels of motivation and self-efficacy and increases the likelihood that they will pursue a future career in the field. By involving more women in STEM fields, new approaches and scientific discoveries could be made possible.

**Funding:** Federal (National Science Foundation)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #28**

The XFL: A Female's Perspective

**Adrienne Uphold\*, Clairice Hemme,\* and Brandie Evans\***

*Adrienne Uphold Reed College of Media, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Gender Studies (Social Sciences)

**Student's Major:** Strategic Communications

The X Football League (XFL) began its short lived era in 2001, as a football league that started its season immediately after the NFL season ended to take advantage of public desire to watch football. Being promoted as having fewer rules, like encouraging rougher play than the NFL and recording publicity stunts inside the cheerleaders locker rooms, the XFL has had its fair share of controversy that contributed to the decline of viewership and ultimately lead to its early death after one season. But one of those controversy stick out more than the others: the treatment of the female cheerleaders. Not only were there cameras in the cheerleaders locker rooms that broadcasted them taking showers, but there have been reports that the women gave lap dances to the players and patrons. The cheerleaders in this league were used as bait to try to draw in an audience. The XFL is starting a new season in 2020. Our research question asks how the past exploitation of the cheerleaders, such as the commercials in the cheerleaders locker rooms, affect the viewership today? Could that cause fewer females to want to be a fan of the XFL? Our hypothesis predicts that after women view the video, we think that women will not want to associate with the XFL.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

Other

**Poster #29**

How Do Sports Teams Gain A Following?

**Gabriella Ambrusico\*, Dalton Benedict\*, and Wesley Ford\***

*Reed College of Media*

**Field (Broad Category):** Other (Social Sciences)

**Student's Major:** Strategic Communications

The XFL is an American football league owned by Vince McMahon, chairman of the WWE, that played one season in 2001. The league will relaunch in 2020. Throughout our research, we are looking more specifically at the Washington D.C. team, and want to know how this team will gain fans, what kind of fans they will be, and how these fans will come about being in such a large area where there are multiple surrounding sport teams and fans already established. The research conducted will include background information on the previous XFL league and the new D.C. team, marketing strategy analysis on the team, challenges and issues the team may face, and key spokespeople for the team. We plan to gather primary and secondary data, along with creating a likert type scale to sample the population we have access to, in hopes of creating a snowball sample. After conducting our primary research, we expect to discover how people view different D.C. sports teams, and how fans decide which teams to cheer for. Using this information, we will find ways for the XFL to distinguish itself in a crowded sports market and make specific recommendations to help the team become successful in the market.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

Other

**Poster #30**

Overall Fan Sentiment Towards the Atlanta Legends Offering a Woman a Full-time Coaching Position

**Mikaeyla Daddio\*, Jennifer Harker, Corey Snodgrass, and Taylor Lloyd**

*Reed College of Media, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Other (Social Sciences)

**Student's Major:** Public Relations

Early 2019, the Allegiance of American Football announced 8 teams, one being the Atlanta Legends, who announced the addition of Jen Welter to their coaching staff. She is one of the first female coaches to accept a position in the NFL. Her gender is something we believe strikes controversy in the NFL because it is a male-dominated industry. The research problem we are focusing on is whether or not a female coach being apart of the Legends in the AAF is looked at positively or negatively. The AAF encourages diversity within the NFL, so we want to research whether their decision to offer Jen Welter a job with the Legends makes a positive or negative impact. The launch of the AAF and the Legends created a buzz all over the internet. We will be observing social media and news outlets to see overall fan sentiment towards a women coach. We have been able to get an idea of the reactions and sentiment towards the Atlanta Legends having a female coach. It is just the beginning of the AAF and their diversity movement into the game of football, so it seems people have a positive sentiment towards Jen and support the Legends. Our research is still being conducted around the feelings towards Jen accepting a position with the Legends, and we predict the sentiment will become negative. The Atlanta Legends are currently the worst team in the league. Due to poor performance, fans will blame Jen because she is a female.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

Other

STCM 421

**Poster #31**

Child Labor Farms in Appalachia

**Samantha Hensley\* and Susanna Donaldson**

*Department of Sociology and Anthropology, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Anthropology & Archeology (Social Sciences)

**Student's Major:** Anthropology and Religious Studies

This study examines child labor use in agriculture and its effects on the children's opinion on farming into adulthood. The purpose of this research is to understand what the aspects of agriculture work has on people when they have worked on a farm during childhood. In order to conduct such research, we first did literature reviews and found what others thought of child labor in America. Interviews then tell us what people in the area of Appalachia think of such work. Through literary analysis, the results have been found that many people have different views. The work is not physically safe, the children do not get paid, and long hours prohibit children from getting a proper education, but some people find the work to be more chore-like than actual labor. Following literary analysis, interviews are to be conducted to tell what those in the area think about this idea of chores versus labor and what is seen as acceptable work for children under 18.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



## Session III (12-1:40 pm) - Biological & Biochemical Sciences

### Poster #32

Impact of Fructose Content in Apple Pomace on Mineral Balance, Renal and Bone Health

**Kathryn Taylor\*, Chris Skinner, Derek Warren, and Janet Tou**

*Division of Animal and Nutritional Sciences, Davis College of Agriculture, Natural Resources, and Design,  
West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Biochemistry (Agriculture/Natural Resources)

**Student's Major:** Biochemistry

Apple pomace is a waste byproduct of apple processing that is an environmental pollutant and economic burden due to disposal cost. Although, apple pomace is a rich source of antioxidants and essential minerals, it is high in fructose. Fructose increases pro-oxidants and inflammation causing renal damage. While apple pomace is high in calcium its absorption can be reduced by fructose. The study objective was to determine whether the fructose content of apple pomace negatively impacts kidney health, calcium balance, and bone indices. Young (age 22-29 days) female Sprague-Dawley rats were randomly assigned (n=8 rats/group) to four diet groups consisting of: 1) a standard purified rodent diet (AIN-93G), 2) AIN-93G + 10% kcal apple pomace, 3) a Western (45% fat, 33% sucrose), and 4) Western + 10% kcal apple pomace for eight weeks. Results showed no significant differences in renal expression of inflammatory genes, nuclear factor kappa B (NFκB), tumor necrosis factor-alpha (TNFα), interleukin-6 (IL-6), or regulator of reactive oxidative species NADPH oxidase 4 (NOX4) determined by real-time quantitative polymerase chain reaction. Bone results showed no significant difference among dietary groups in femur size or calcium content as determined by inductively coupled plasma optical emission spectroscopy. There were no significant differences in calcium absorption despite higher fructose content in apple pomace groups. Based on the results, the impact of caloric replacement of diets with 10% apple pomace is minimal indicating that apple pomace is safe to repurpose for human consumption.

**Funding:** Institutional (WVU & Hatch WVA 1017641)

**Program/mechanism supporting research/creative efforts:**  
a WVU 497-level course

**Poster #33**

Functional analysis of a flavin monooxygenase gene involved in synthesis of lysergic acid amides

**Jessi K. Tyo\* and Daniel G. Panaccione**

*Division of Plant and Soil Sciences, Davis College, West Virginia University, Morgantown, WV*

**Field (Broad Category):** Biochemistry (Agriculture/Natural Resources)

**Student's Major:** Biology

Ergot alkaloids are specialized metabolites produced by certain fungi. Many important ergot alkaloids are lysergic acid amides, such as ergonovine and lysergic acid alpha-hydroxyethylamide (LAH). Lysergic acid amides are important in agriculture, where they are used as insecticides and also in medicine, where they serve as the basis of drugs treating dementia and migraines. The pathway to create ergonovine is established, but the pathway to LAH is unknown. Based on genome sequence comparisons we hypothesized that a flavin monooxygenase gene (*easO*) was involved in the production of LAH. Using PCR methods, we prepared a gene knock out construct and introduced it into the LAH-producing fungus *Metarhizium brunneum* by protoplast transformation. Knock outs were identified by PCR strategies that showed the knock-out construct had integrated into the *easO* locus. High performance liquid chromatography (HPLC) and HPLC-mass spectrometry (LC-MS) analyses demonstrated that the knock-out fungal strains lacked LAH and retained ergonovine. The data supported our hypothesis that *easO* was involved in the production of LAH. The ergonovine-accumulating *easO* knockout strain was injected into larvae of *Galleria mellonella* to investigate its virulence relative to wild-type (LAH-accumulating) *M. brunneum*. Ergonovine-accumulating knockout strains killed larvae faster than the LAH-accumulating wild type; however, the *easO* knockout fungus rarely emerged from dead larvae, whereas the wild-type fungus sporulated profusely on larval cadavers. These data indicate that ergot alkaloids play a role in the interaction of *M. brunneum* with insects. An understanding of the production of lysergic acid amides is beneficial because of their agricultural and medical implications.

**Funding:** Federal (NIH)

**Program/mechanism supporting research/creative efforts:**

Biology 486 capstone

**Poster #34**

Assessing Protein Quality and Safety of Silver Carp-Derived Protein Sources Using Growing Rat Model

**Lynsey Soule\*, Derek Warren, Chris Skinner, Kristen Matak, and Janet Tou**

*Division of Animal And Nutritional Science, Davis College, West Virginia University, Morgantown, WV  
26506*

**Field (Broad Category):** Human Nutrition and Foods (Agriculture/Natural Resources)

**Student's Major:** Biology

Demand for protein supplements is increasing as the populations grows and food resources become overextended. Silver carp, an invasive species in the US, provides a potential protein source. The objective of this study was to evaluate the protein quality and safety of a carp-derived protein for human consumption. Female Sprague-Dawley rats (aged 28 days) were randomly assigned (n=8 rats/group) to: 1) carp processing byproduct (sarcolemmic protein), 2) casein 3) whey or, 4) casein followed by a no protein diet. Protein quality measurements included: 1) True Digestibility (D) 2) True Biological Value (BV) 3) Net Protein Utilization (NPU) 4) Protein Efficiency Ratio (PER) 5) Protein Digestion Corrected for Amino Acid Score (PDCASS). There were no differences in any protein quality measurements with the exception that PDCASS was lower ( $p<0.05$ ) for carp than casein and whey protein. Rat consuming casein and carp protein showed no differences in growth and gonadal fat weight while rats consuming whey had heavier ( $p<0.05$ ) body weight and adiposity. Amino acid profile measured by gas chromatography coupled to mass spectrometry found liver and muscle amino acid composition was not different among dietary protein groups. Kidney weights and serum biomarkers of renal damage were not significantly different. There were also no differences in femur size, mineral content, calcium and phosphorus content, or bone strength between carp and the other proteins. Collectively, results showed the protein quality of carp protein is comparable to popular milk protein supplements and safe for human consumption indicating carp's potential as novel sustainable protein source.

**Funding:** Federal (NIFA/USDA grant)

**Program/mechanism supporting research/creative efforts:**

Biology 486 capstone

**Poster #35**Characterization of the Terpene Synthase Gene Family in Black Raspberry (*Rubus occidentalis*)**Fiona Galley,\* and Michael Gutensohn***Davis College of Agriculture, Natural Resources, and Design, West Virginia University, Morgantown, WV 26506***Field (Broad Category):** Other (Agriculture/Natural Resources)**Student's Major:** Biology and Public Health

Terpenes are a class of volatile organic compounds that are widespread throughout plant species and vary in their biological functions. Terpene molecules emitted from different tissues provide benefits to the plant including the attraction of pollinators and seed dispersers, as well as defense against herbivores. Terpene synthases are key enzymes responsible for the biosynthesis of terpenes within plants. The terpenes found within a plant species or a plant tissue will vary depending on the terpene synthase genes found in the genome of that plant species and expressed in the respective tissue. Due to the recent publication of the *Rubus occidentalis* (black raspberry) genome, the terpene synthase genes within this plant species are now able to be characterized. A phylogenetic and functional analysis of terpene synthase genes in the *R. occidentalis* genome in comparison with terpene synthases in other plant species in the Rosaceae family, specifically *Fragaria ananassa* (strawberries) and *Malus domestica* (apples), gives an insight into the biological similarities of these fruit crops. Terpene production, as well as expression of the terpene synthases, are being studied in different tissues, at different developmental stages and environmental conditions with *R. occidentalis* plants. Biochemical characterization of individual terpene synthases in *R. occidentalis* allow determination of their substrate and product specificities. The central hypothesis is that members of the terpene synthase gene family in black raspberry show similarities to those found in other Rosaceae fruit crops, specifically apples and strawberries, based on sequence homology and enzyme activities, but are involved in different biological functions.

**Funding:** Not funded**Program/mechanism supporting research/creative efforts:**

Biology 486 capstone

HORT 495 Independent Research

**Poster #36**

Identifying the relationship between *Ambystoma maculatum* density and genetic shedding using Environmental DNA

**Michelle Williams,\* Yvette A. Halley, Eric R. Merriam, Amy B. Welsh, Todd J. Petty, and James T. Anderson**

*Department of Biology, WVU, Morgantown, wv 26506; Division of Forestry and Natural Resources, West Virginia University, Morgantown, WV, 26506*

**Field (Broad Category):** Other (Agriculture/Natural Resources)

**Student's Major:** Biology

Conservation biology and management are extremely dependent on the knowledge of species distribution. However, the detection and identification of many fish and amphibian communities can prove to be problematic because of the nature of various inhabitants. The recent use of environmental DNA (eDNA) in conjunction with quantitative PCR (qPCR) offers the possibility of using eDNA techniques to determine population abundance in an ecosystem. When compared to traditional methods, eDNA provides a potentially more accessible, cost-effective, and noninvasive sampling technique; making it ideal for species detection across a wide variety of environments. This is especially important for conservation research in aquatic environments, especially wetlands. Due to their sensitivity to habitat fluctuations, amphibians are a popular choice for indicator species to determine the health of an ecosystem. Spotted salamanders, *Ambystoma maculatum*, were used as a model species to quantify eDNA concentration in wetland vernal pools. Quantitative PCR (qPCR) was used to determine the lowest salamander density that produces successful detection of the amplicon.

**Funding:** Federal (NSF)

**Program/mechanism supporting research/creative efforts:**

Biology 486 capstone

**Poster #37**

Comparison of Case Report Quality Among Otolaryngology Journals

**Yousef Altatan,\* Nasser Al-Rayyes\*, Newby, Maxwell, and Michele Carr**  
*Department of Otolaryngology, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Medical Sciences (Health Sciences)  
**Student's Major:** Biology

Information and knowledge are extremely important in a multitude of occupations, especially in the medical field. Case reports of other physicians' cases and experiences are a traditional source of information. Good quality case reports are essential. The 2017 CARE guidelines for evaluating case reports is one way of evaluating quality of case reports. This is a 13-section, 28-point checklist used to evaluate completeness of a medical case report. In this study, the journals Journal of the American Medical Association-Otolaryngology (JAMA), International Journal of Pediatric Otorhinolaryngology (IJPO), and Case Reports in Otolaryngology (CRO) were evaluated using the 2017 CARE guidelines. Twenty-five case reports from September 2017 to June 2018 were randomly chosen from the journal websites to prevent bias during case selection. Mean scores were 12.68 for JAMA, 15.48 for IJPO and 14.52 for CRO, which was significantly different ( $P=0.018$ ). There were significant differences in the presence of keywords, quality of the abstract, introduction, follow-up, and discussion ( $P<0.05$ ). There is a need for improvement of case reports within the otolaryngology literature. Continued analysis will be focused on how to best improve the quality of case reports and will be included in the final presentation.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**  
My efforts were mainly voluntary.

**Poster #38**

A Role For Extracellular-Vesicles As Potential Mediators of Epigenetic Silencing in Septic Shock Patients

**Ahmad Dakhlallah,\* Jon Wisler, Yijie Wang, Amy Gross, Duaa Dakhlallah, Mya Vannoy\*, Timothy D. Eubank, and Clay Marsh**

*Microbiology Immunology and Cell Biology department, School of Medicine, West Virginia University, Morgantown, WV, 26506*

**Field (Broad Category):** Medical Sciences (Health Sciences)

**Student's Major:** Biology

**Rationale.** Sepsis is a disease of systemic immunosuppression associated with poor prognosis and increased risk of infection, and morbidity. Recent studies suggest that epigenetic regulation of key inflammatory mediators including autophagy may be responsible. We observed that Extracellular-Vesicles (EVs) carry miRNA, mRNA and proteins that can be transferred to target cells upon EV uptake. During septic shock, EV production is increased. Thus, we hypothesized that DNMT mRNA transcripts may be transferred from EVs to naïve-monocytes and reduce inflammatory gene expression through DNA promoter CpG island methylation. **Methods.** Human plasma samples were obtained from patients (critically-ill non-septic, septic, and septic shock) on days 1, 3 and 5 after diagnosis and EVs were isolated. EVs were characterized by qRT-PCR for DNMTs mRNA expression followed by treating naïve primary human monocytes and HUVEC with these EVs. Autophagy and inflammatory gene expression was quantified in EV-recipient cells. TNF- $\alpha$  promoter and autophagy genes were analyzed for protein production by ELISA and Methyl-specific PCR for DNA methylation. **Results.** Septic EVs had significantly increased DNMT mRNAs compared to controls over the course of 5 days. Naïve monocytes and HUVEC treated with septic EVs demonstrated increased DNMTs expression, reduced TNF- $\alpha$  and halted autophagy pathway. **Conclusions.** These data demonstrate that DNMTs mRNA are highly expressed in septic EVs and can cause proinflammatory cytokine and autophagy gene silencing by DNA methylation and silencing. Targeting of circulating EVs with FDA DNMTs approved-inhibitors may be a therapeutic strategy in specific patients with deregulated epigenetic mechanisms to limit both early and chronic consequences.

**Funding:** Federal (NIH)

**Program/mechanism supporting research/creative efforts:**

WVU Work Study (not associated with RAP)

**Poster #39**

Neutrophil Traps as a Mechanism Behind Thrombosis in Cancer Associated Hypercoagulability

**Kristin Ruddle,\* Courtney Sevits, Matthew Fagan, and Brian Boone**

*Department of Surgery, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Medical Sciences (Health Sciences)

**Student's Major:** Biology, Psychology

Hypercoagulability and deep vein thrombosis (DVT) have a high prevalence among pancreatic cancer patients, though investigation of the underlying causes and predispositions are poorly understood. Research has indicated that neutrophil extracellular traps (NETs) may play a significant role in the onset and continuation of hypercoagulability, which can lead to DVT. NETs influence coagulation by releasing intracellular components, such as DNA and HMGB1, a significant mediator of DVT. Thromboelastography (TEG) and platelet aggregometry are ways of assaying blood to measure parameters, such as clotting rate and maximum clot strength. We are using these techniques to identify markers that may be helpful in the early detection and early intervention of hypercoagulability. We are currently investigating the pattern of TEG and platelet aggregometry parameters within pancreatic cancer patients to further identify markers. Murine blood samples were collected from mice with pancreatic cancer and the control sample. The blood assays were run through both TEG and platelet aggregometry, which produce curves demonstrating clot formation and platelet activation and aggregation. We predict that the control mice will show parameters within the respective normal ranges while the cancer-ridden mice are expected to show low R-values (clotting time), with high K,  $\alpha$ , and MA values in TEG curves (higher clot strength), with shorter lag times, and larger maximum amplitudes and slopes in platelet aggregometry curves, suggestive of increased platelet aggregation. The results of this study may provide better efficacy in screening the susceptibility of hypercoagulability and DVT among pancreatic cancer patients, thus promoting prevention.

**Funding:** Institutional (American Cancer Society)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Poster #40**

Daily Rhythms in BBB Permeability Alter Efficacy of Chemotherapy in a Brain Metastases Model

**Alexis L. Kaper,\* William H. Walker II, and Randy J. Nelson**

*Department of Neuroscience, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Neuroscience (Health Sciences)

**Student's Major:** Biology

Physiology and behavior are optimally regulated in most organisms via circadian clocks. Chrono-chemotherapy aims to take advantage of circadian control of physiological processes by optimally timing chemotherapy administration to reduce adverse side effects and increase anti-tumor efficacy. Treatment of brain metastases with chemotherapy has yielded mixed results when compared to treatment of peripheral tumors, likely reflecting the inability of chemotherapy to cross the blood-brain barrier (BBB) and/or blood-tumor barrier (BTB) at an efficacious rate. To date, no study has demonstrated ideal timing of chemotherapy administration to treat brain metastases. Therefore, we sought to determine the optimal timing of chemotherapy administration in a mouse model of brain metastases of breast cancer. Female NU/NU mice received 100µl intracardiac injections of  $1.75 \times 10^5$  JIMT-1 cells. Twenty-nine days into tumor development mice underwent bioluminescence imaging and were randomly assigned groups; inclusion criteria for the study was  $1.5 \times 10^5$  average radiance within the brain. The following day mice received a 100 µl tail vein injection of C14-paclitaxel (10µCi) at one of four time points (ZT0, ZT5, ZT14, ZT17). Two hours following the injection, a submandibular blood sample was obtained, mice were perfused, and the brain was extracted and flash frozen in isopentane. Brains were sectioned at 20 µm onto glass slides and placed in autoradiography cassettes for three weeks. After three weeks of development, Phosphor screens were read using a Typhoon phosphor imager, and C14-paclitaxel concentrations within each brain metastasis was determined using MCID software. Ultimately, we predict that optimal timing of chemotherapy will increase anti-tumor efficacy.

**Funding:** Institutional (Rockefeller Neuroscience Institute)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #41**

Social Enrichment Attenuates Chemotherapy Induced Neuroinflammation and Affective Behavior Via Oxytocin Signaling

**Laura E. May,\* William H. Walker II, Randy J. Nelson, and A. Courtney DeVries**  
*Department of Neuroscience, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Neuroscience (Health Sciences)

**Student's Major:** Biology

Patients receiving chemotherapy frequently display increases in anxiety and depression. However, the precise mechanism for chemotherapy-induced neuropsychological effects remains unknown. We demonstrate increased peripheral inflammation one day following, and neuroinflammation seven days following, the completion of one cycle of dose-dense AC (doxorubicin and cyclophosphamide) therapy. Because of the demonstrated beneficial effects of social enrichment on a multitude of diseases, we examined whether social enrichment (pair housing) could attenuate the increase in peripheral and central inflammation following chemotherapy administration. We demonstrate that singly housed mice receiving AC therapy display increased depressive-like (forced swim test) and anxiety-like (open field test) behavior with a concurrent increase in neuroinflammation and reduced neurogenesis. Pair housing mice throughout chemotherapy treatment lead to an attenuation in neuroinflammation, depressive-like behavior, and loss of neurogenesis. The beneficial effects of social enrichment have previously been associated with increased oxytocin signaling within the brain. Therefore, we sought to determine if ICV administration of oxytocin to singly housed animals could recapitulate the protective effects of pair housing. Indeed, administration of oxytocin to singly housed mice receiving chemotherapy mirrored the effects of pair housing. Additionally, administration of oxytocin antagonist to pair house mice receiving chemotherapy mirrored the effects of single housing, demonstrating a potential role for oxytocin. Together, these data add to the growing literature detailing the negative side effects of chemotherapy and provide further evidence that social enrichment may be beneficial in offsetting some of the adverse side effects.

**Funding:** Federal (National Cancer Institute)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #42**

Determination of regulatory relationship between FIGLA and the *Bos taurus* zinc finger protein, ZNFO

**Kyle A. Davis,\* Mingxiang Zhang, and Jianbo Yao**

*Department of Biochemistry, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Biochemistry (Sciences)

**Student's Major:** Biochemistry

A larger and more holistic understanding of early embryonic development requires the analysis of gene regulatory networks that are expressed either predominantly or specifically during this time period. Factor in the Germline Alpha (FIGLA) is an oocyte-specific, basic helix-loop-helix transcription factor that has shown to be an active transcriptional regulator during embryonic development. To date, homologues of FIGLA have been identified in mice, cattle, humans, and zebrafish (1). Previous efforts to characterize the bovine oocyte transcriptome have led to the identification of a novel zinc finger protein, named ZNFO, which is explicitly expressed in the bovine oocyte. Through sequence analysis, the promoter region of ZNFO was found to contain several E-boxes inside its promoter, which are known binding targets of the FIGLA protein. In an effort to determine if a regulatory relationship between FIGLA and the promoter region of ZNFO exists, ZNFO's promoter region was amplified and cloned into a promoterless pGL4.14[Luc2/Hygro] luciferase vector. This construct was then co-transfected alongside either an empty pcDNA3.1 vector or one which contained the FIGLA gene, along with a pRL-CMV vector encoding the Renilla luciferase gene. After measuring both luciferase activities, the normalized values of each experimental group were calculated and compared to determine if any statistically significant differences were observed. The results indicate that a relationship does exist and that it is of an inhibitory nature. The results herein point to a repressive role of FIGLA in terms of the ZNFO gene, although further analysis is still needed in order to confirm this.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:**  
capstone course within my department

**Poster #43**

Investigation of ribozyme and protein assisted splicing of an unusual hybrid group IIE intron

**Brianna Hodak\* and Aaron Robart**

*Department of Biochemistry, Health Sciences Campus, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Biochemistry (Sciences)

**Student's Major:** Biochemistry

Group II introns are a unique class of catalytic RNA, or ribozyme, that perform intron splicing reactions. These elements provide a streamlined system to gain mechanistic insights into the complexity of the splicing reaction performed by the multi-megadalton spliceosome complex in mammalian cells. Ta.sp I2, or *Thermoanaerobacter* Species Intron II, is a bacterial class E maturase splicing construct. Ta.sp I2 is comprised of both a structured RNA element and an intron encoded reverse transcriptase (RT) that assists splicing by binding at a specific RNA coding site. Introns can initiate splicing by base-pairing with exons. Ta.sp I2 is unique in that it is a group IIB/ IIC hybrid. The main goal of this project is to study the hybrid lariat activity to see if it undergoes a hydrolytic pathway or takes part in another splicing pathway and the effects of coupling this reaction with a protein. Here we characterize, for the first time, the functionality of IIE intron splicing in both ribozyme and protein assisted splicing pathways. Preliminary data suggests that IIE hybrid ribozyme splicing activity is predominantly hydrolytic. Our current efforts are focused on coupling this reaction with the intron encoded protein to test our hypothesis that this intron encoded protein promotes splicing through the branched lariat pathway.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #44**

Feeding Rats Different Sources of Omega-3 Polyunsaturated Fatty Acids Altered Liver-Adipose Lipogenic Gene Expression

**Garima Agarwal,\* Minahal Naveed,\* Kaitlin Mock,\* Vagner Benedito and Janet Tou**

*Division of Animal and Nutritional Sciences, 2Division of Plant and Soil Sciences. Davis College of Agriculture, Natural Resources, and Design. West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Biochemistry (Sciences)

**Student's Major:** Biochemistry

Omega-3 polyunsaturated fatty acid (n-3 PUFA) rich oils are among the most popular supplements in United States and are widely used for various health benefits. Non-alcoholic fatty liver disease (NAFLD), characterized by triacylglycerol (TAG) accumulation, affects an estimated quarter of the world's population. Increasing n-3 PUFA consumption plays a preventative role in NAFLD. Mechanisms whereby n-3 PUFAs decreases NAFLD is by reducing de novo lipogenesis and enhancing fatty acid -oxidation. However, it is unknown which source of n-3 PUFA is most effective for reducing risk of NAFLD. Plant oils are rich in the n-3 PUFA, alpha-linoleic acid (ALA). Marine sources are rich in long chain n-3 PUFAs, eicosapentaenoic acid (EPA, 20:5n-3) and docosahexaenoic acid (DHA, 20:6n-3). However, the amount of EPA and DHA varies depends on the fish species. In fish oils n-3 PUFAs are mainly esterified to TAGs; whereas, in krill oil EPA and DHA are esterified to phospholipids which this has been suggested to increase n-3 PUFA bioavailability. The study objective was to investigate the effect of different sources of n-3 PUFA on liver and adipose lipid metabolism. Young (age 28 d) female Sprague-Dawley rats were randomly assigned to experimental diets consisting of corn, flaxseed, krill, menhaden, salmon or tuna oil for eight weeks. We hypothesize that the oil source providing the highest doses of DHA and EPA, salmon and tuna oil will down-regulate gene expression of de novo lipogenesis and up-regulate gene expression of fatty acid -oxidation in adipose tissue and liver to reduce NAFLD risk.

**Funding:** Federal (NIFA/USDA)

**Program/mechanism supporting research/creative efforts:**

Biology 486 capstone

**Poster #45**

The Effect of Small Molecules on Aggregation of Huntingtin in the Presence of Lipids

**Iraj Hasan,\* Maryssa Beasley, and Justin Legleiter**

*C. Eugene Bennett Department of Chemistry, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Biochemistry (Sciences)

**Student's Major:** Biology

Huntington's disease, a major neurodegenerative disease, is caused by an expansion of a polyglutamine tract in the huntingtin protein with greater than ~ 35 repeats being the critical threshold for disease. Polyglutamine expansion causes the huntingtin protein to aggregate into slender fibrous structures known as amyloid fibrils that are associated with Huntington's disease. Small molecules such as curcumin, Riluzole, and EGCG reduce fibril formation in solution. However, huntingtin is highly associated with lipid membranes, and it is unclear if these small molecule fibril inhibitors would still be effective in the presence of lipids. We investigated if these small molecules are still effective in inhibiting fibril formation in the presence of lipids. Thioflavin T assays were used to determine the effectiveness of curcumin, Riluzole, and EGCG to inhibit fibril formation in the presence and absence of lipids. Thioflavin T is a dye that fluoresces upon binding fibrils and can be used to track fibril formation as a function of time. Atomic force microscopy (AFM), a high resolution imaging technique, was used to determine if the shape of fibrils was altered under the different conditions. Without lipids, Riluzole had little effect on fibril formation. In the presence of POPC lipid vesicles, however, Riluzole promoted a distinct aggregate structure. Curcumin slightly decreased fibrils in the absence of lipids, and was less effective in the presence of POPC lipid vesicles. EGCG promoted the formation of large clumps of protein rather than fibrils in the absence and presence of POPC lipid vesicles.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #46**

Musashi proteins effect gene splicing in photoreceptors

**Jessica Link,\* Bohye Jeong, Fatimah Matalka, and Peter Stoilov**

*Department of Biochemistry, Robert C. Byrd Health Science Center School of Medicine, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Biochemistry (Sciences)

**Student's Major:** Biology

Musashi 1 and 2 are proteins found in the photoreceptors of mammals. They take part in the regulation of gene splicing and cell maintenance. This study has been researching the role of Musashi 1 and 2 in gene splicing, such as where in the sequence it regulates and its role in photoreceptor repair. Our lab is focusing on Musashi's impact on mice in particular. The mice are bred with the chosen genetic mutations, and then their vision is observed by using electroretinography techniques, observing the reaction of the mice to a stimulus, in our case a bright light. This research includes frequent polymerase chain reactions (PCRs), gel electrophoresis techniques, and bacterial transformations. We genotype the mice to determine which gene knockouts they possess, if any. My role in the lab has been assisting running the PCRs, making the gels for electrophoresis, creating the liquid buffers for the gels, and assisting the other lab technicians with their respective tasks. This research is adding to our limited knowledge of proteins' roles in gene splicing and regulation, working with labs across the globe to expand our world view, starting with the smallest polypeptide.

**Funding:** Other

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #47**

Analysis of a Mutation in Human CK2 Associated with Developmental Defects in 'Okur-Chung's Neuropathy'

**Nila Manivannan,\* Scott Arbet, and Ashok P. Bidwai**

*Department of Biology, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Biology (Sciences)

**Student's Major:** Biochemistry, Psychology

CK2 is a highly conserved eukaryotic Ser/Thr protein kinase. This enzyme regulates vital functions including control of transcription, translation, cell cycle progression, and animal development. Importantly, loss of CK2 activity in yeast, flies and mammals elicits lethality and, in the latter two, an inability to complete embryogenesis. It was thus unexpected that mutations in the human CSNK2A1 gene underlie 'Okur-Chung's Neuropathy,' characterized by diverse neurodevelopmental defects and physical deformities. Greater than ten mutations have been identified, most altering highly conserved residues. It is unclear how these mutations individually impact CK2, reasons for which a single residue has been chosen for analyses. The mutation to be analyzed is Y50S, which is uniquely located in the CK2 $\beta$ -interaction motif and near the ATP-binding loop. It is hypothesized that this mutation is likely to perturb kinase activity and decrease the interaction of CK2 $\alpha$  with the CK2 $\beta$  regulatory subunits. This mutation is being analyzed in a functional yeast-based bioassay, that reflects the ability of metazoan CK2 subunits to rescue the lethal effects of loss of endogenous yeast-CK2 genes. CK2-Y50S has been generated through PCR-based mutagenesis and verified by Sanger sequencing. The Y50S mutant has subsequently been cloned into vectors with the GAL1/10 promoter to induce expression in yeast and assess protein-protein interactions. The CK2 $\alpha$ -Y50S mutant and its wild-type counterpart are being evaluated for their ability to rescue yeast lacking endogenous CK2 genes, their levels of expression, and their interaction with CK2 $\beta$  using yeast two-hybrid analyses.

**Funding:** Federal (NASA West Virginia Space Grant Consortium)

**Program/mechanism supporting research/creative efforts:**

Biology 486 capstone



## Session III (12-1:40 pm) - Health Sciences

### **Poster #48**

Identification of a Sulfonamide Analog that Reduces Cell Viability in B-cell Acute Lymphoblastic Leukemia

**Nolan R. Holley,\* Debbie Piktel, Werner J. Geldenhuys, Karen H. Martin, Bin Su and Laura F. Gibson**

*WVU Cancer Institute, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Biochemistry (Health Sciences)

**Student's Major:** Biochemistry

Relapse of disease remains an ongoing challenge in the treatment of acute lymphoblastic leukemia (ALL). The inability to fully eliminate and halt production of leukemic cells within the bone marrow (BM) microenvironment has been determined to contribute to minimal residual disease (MRD). Given the resistance of these cells to standard-of-care treatments, the identification of novel therapies that target the leukemic niche and sensitize the resistant cells to chemotherapy resulting in eradication remains an ongoing pursuit. Towards this goal, we utilized a library of 41 compounds that are members of a sulfonamide chemical family in a cell viability screening assay. An initial primary screening in REH and TOM-1 ALL cells identified the sulfonamide analog, N-{4-[2-(3,4-dimethoxyphenyl)-2-oxoethyl]-2-[2-(2,5-dimethylphenyl)ethyl]phenyl}-N-methylmethanesulfonamide (Compound B4) as a potential candidate. A secondary screening found a dose-dependent response in six ALL cell lines. In an effort to characterize the interaction between Compound B4 and ALL cells in the leukemic niche, western blot analysis was performed in key ALL oncoproteins utilizing a co-culture experiment. Compound B4 was found to have acted on FAK, AKT, and  $\beta$ -catenin, while not significantly effecting Src. Given the dramatic increase in phosphorylation of AKT when treated with Compound B4, Compound B4 was paired with MK-2206, an inhibitor of AKT phosphorylation, and an additive effect was observed in media culture. Taken together, Compound B4 seems to serve as an anti-proliferative compound, interacting with pathways previously determined to be associated with drug resistance in ALL. Compound B4 in combination with other drugs may potentially yield a novel treatment strategy.

**Funding:** Private (Edward L. Reed Cancer Research Endowment, the Dr. David B. McClung Cancer Research Endowment, the Edwin C. Spurlock Fellowship, and the Joe Marconi Cancer Research Fellowship)

**Program/mechanism supporting research/creative efforts:**  
the WVU Cancer Research Fellowship program

**Poster #49**

Emergency Department Visits by Pediatrics Patients for Snakebites

**Emily Marple,\* Allison Tadros, Mindy Sharon, and Stephen Davis**

*Department of Emergency Medicine, WVU School of Medicine, Morgantown, WV 26505*

**Field (Broad Category):** Environmental Science & Sustainability (Health Sciences)

**Student's Major:** Animal and Nutritional sciences

This study sought to examine characteristics of pediatric patients presenting to the ED nationally after sustaining a snakebite injury. In this retrospective cohort study, data was obtained from the Nationwide ED Sample for the years 2006-2014. Pediatric patients who sustained a snakebite were identified with the ICD 9 E codes of E905 or E906. Data extracted included age, gender, insurance status, disposition, trauma designation of the hospital, ED charges, and geographic region. Comparative analyses were performed for patients under 11 and 11-17 years, as well as snakebite victims versus non-victims. There were an estimated 24,388 ED visits from 2006-2014 by pediatric patients for snakebites: 10,554 under 11 and 13,834 11-17 years. The majority of patients were discharged from the ED in both; however, 12% under 11 and 10% 11-17 were admitted, while 15% of those under 11 and 10% 11-17 were transferred to another facility. No related deaths were recorded. The average ED charge for a patient with a diagnosis other than snakebite was \$1,009 (under 11 years) and \$1,512 (11-17 years) less. Medicaid was the primary insurer of the younger cohort, while private insurance was the most common payer of older cohort. The majority of pediatric snakebites are males seen in non-trauma centers and in the South region. The mean charge for a snakebite victim is higher than the average cost of an ED visit from other causes. Most patients were discharged from the ED, with a small percentage being admitted or transferred to another facility.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

My efforts were mainly voluntary.

**Poster #50**

Mitochondrial Non-Coding RNA Import through the KH and S1 Domains of Polynucleotide Phosphorylase (PNPase)

**Garrett K. Fink,\* Quincy A. Hathaway, Andrew D. Taylor, Amina Kunovac and John M. Hollander**  
*Division of Exercise Physiology, West Virginia University School of Medicine, Morgantown 26505, WV, USA*

**Field (Broad Category):** Exercise Science & Nutrition (Health Sciences)

**Student's Major:** Exercise Physiology

Type 2 diabetes mellitus (T2DM) affects one in ten Americans with the prevalence of the pathology increasing in a large portion of developed nations. T2DM can often lead to changes at the cellular level, including altering mitochondrial function in the heart. Mitochondria are important for carbohydrate and fatty acid metabolism, providing up to 90% of the energy required for the heart to contract. Polynucleotide Phosphorylase (PNPase, an inner mitochondrial membrane protein) is known to function as a tRNA importer into the mitochondrion. The purpose of our work is to understand how, mechanistically, PNPase transports RNAs into the mitochondrial matrix and if its binding potential includes other non-coding RNA, such as microRNAs and long non-coding RNA. In an immortalized, murine cardiac cell line (HL-1), we propose examining the knockout of RNA binding domains (KH and S1) of PNPase to determine RNA binding/import potential. Through the use of expression vectors and CRISPR/Cas9, we will examine cellular and molecular consequences from KH and S1 domain knockout cell lines. We have developed an sgRNA based CRISPR/Cas9 targeting approach against exon 23 (KH domain) and exon 26 (S1 domain), the RNA binding domains of PNPase, to eliminate import functionality. In future experiments, we will be studying animal models to assess mitochondrial functionality with different regions of the protein being absent to assess which of the domains are more imperative in this import mechanism. With this study, we hope to develop a better understanding of the protein to further our treatment modality for T2DM.

**Funding:** Federal (R01 HL-128485 (JMH) and American Heart Association AHA-17PRE3366033 (QAH)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #51**

Exercise Physiology Experiential Learning Improves Self-Efficacy in Undergraduate Students

**Ryan A. Hayes,\* Miriam P. Leary, and Lori A. Sherlock**

*Department of Exercise Physiology, West Virginia University, Morgantown, 26506*

**Field (Broad Category):** Exercise Science & Nutrition (Health Sciences)

**Student's Major:** Exercise Physiology

This mixed methods, experiential learning pilot research project incorporated multiple teaching methodologies (lectures, peer-reviewed research readings, applied practice, professional experience, service learning reflection, and discussion) to assess improvements in knowledge and self-efficacy in exercise physiology (EXPH) human performance testing. Six undergraduate EXPH students completed a pre-intervention lactate threshold quiz. Participants received a lecture on lactate production and threshold and discussed peer-reviewed research readings. Supervised training and practice was held prior to conducting lactate threshold testing on the WVU Women's Rowing Team. After data collection, participants met to review physiological concepts, data collection procedures, discuss research readings, and reflect on the service component of the project. Participants completed the lactate threshold quiz as well as an anonymous, online, 15-question self-efficacy and satisfaction survey with answer choices on a 7-point Likert scale. A focus group discussion captured participants' perceptions of the experiential service learning project. Qualitative data was content analyzed to identify common themes using independent data reviewers. All participants felt this project would allow them to make a difference in [their] community, meaningfully and effectively interact with relevant professionals, and apply [their] knowledge in ways that solve problems in their field. Compared with a pre-assessment, participants scored 10% higher on the lactate knowledge quiz at the end of the experiential learning project. Students reported improved self-efficacy, knowledge, communication, and confidence in exercise physiology related content and professional skills. An experiential learning project incorporating multiple teaching methodologies successfully improved knowledge, self-efficacy, and professional skills in human performance testing.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

My efforts were mainly voluntary.

**Poster #52**

Study of Antigenic Peptides in *Pseudomonas aeruginosa*

**Emily Airing,\* Mariette Barbier, Catherine Blackwood, and Emel Sen-Kilic**

*Department of Immunology and Medical Microbiology, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Medical Sciences (Health Sciences)

**Student's Major:** Immunology and Medical Microbiology

*Pseudomonas aeruginosa* is an opportunistic bacterial pathogen with high infection rates in hospitals. This bacterium tends to have a high colonization rate in patients with burn wounds, the chronically ill, the elderly, and those with compromised immune functions. More specifically, this type of bacterial infection is common in Cystic Fibrosis patients. The overall mortality rate associated with these cases is approximately 29%, and as the global geriatric population exponentially grows, it is projected that bacterial infection cases will also increase. Many antimicrobials are ineffective against *P. aeruginosa*, as the species has a high intrinsic resistance to antibiotics. A vaccine could potentially increase bacterial clearance by harnessing the body's natural immune response to kill cells more efficiently. This vaccine is being created using peptides, or antigenic regions of the cell's proteins rather than the entire protein, as peptides are more soluble and easier to use as antigens. The component of *P. aeruginosa* targeted in this vaccine is an iron acquisition system, which is vital to the bacterium's living functions including growth and cell development. The effectiveness of the vaccine is examined with ELISA testing; the concentration of antibodies in a sample is determined with a proportional absorbance value. Vaccination using a cocktail of six peptides, as well as a whole cell vaccine, resulted in antibodies that bound peptides one, three, four, and six. The adjuvant-vaccinated mice, as expected, did not garner a response. In future experimentation, these peptides will be included into a larger vaccine to determine their continued effectiveness.

**Funding:** Institutional (Wvu Vaccine Development center, and the Cystic Fibrosis Foundation)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #53**

Development of a Monocyte-specific, Fluorescent-tagged Mouse Strain to Investigate Monocyte Pathogenicity Post Ischemic Stroke

**Katherine S. Lee\* and Edwin C.K. Wan**

*Department of Microbiology, Immunology, and, Cell Biology; Department of Neuroscience, West Virginia University School of Medicine, Morgantown WV, 26506*

**Field (Broad Category):** Medical Sciences (Health Sciences)

**Student's Major:** Immunology and Medical Microbiology

Monocytes are cells of the innate immune system that play a crucial role in promoting tissue inflammation. These cells reside in the blood and bone marrow normally, but following ischemic stroke rapidly move towards the brain where they can cause tissue damage. It is currently unclear what cellular signal(s) control monocyte activation, or the ways in which monocytes then interact with other cells in the brain. Answers to these questions can be found by using genetically-modified mouse models which allow us to track and examine monocyte activity using live-imaging technology following stroke induction, and through the deletion of critical genes that control monocyte functions. Our goal is to develop this animal model, designated the CCR2-specific-tdtomato/Cre mouse strain, which will feature the expression of red-fluorescent protein tdTomato and the gene-deleting element Cre within the monocyte-specific CCR2 gene locus. Successful insertion of these elements into the CCR2 locus will allow the monocytes to express both tdtomato and Cre. Results thus-far report successful development of the tdtomato/Cre DNA construct for future generation of this animal model by the following steps: 1) isolation of tdtomato/Cre-containing plasmid DNA from bacteria, 2) generation of tdtomato/Cre RNA through in-vitro transcription, 3) creation of complementary DNA from the RNA by reverse transcription. Additionally, we have demonstrated with in-vitro CRISPR/cas9 cutting techniques that the construct can be inserted into the CCR2 locus. In future steps we hope to assemble our construct into the CRISPR/cas9 complex for gene insertion into a mouse embryo.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #54**

Optimizing Protocols for the Development of Polyclonal Antibody Treatments Against *Pseudomonas aeruginosa*

**Aaron C. Malkowski,\* Emel Sen-Kilic, Justin Bevere, Catherine Blackwood, and Mariette Barbier**  
*Vaccine Development Center, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Medical Sciences (Health Sciences)

**Student's Major:** Immunology and Medical Microbiology

*Pseudomonas aeruginosa*, an opportunistic, Gram-negative bacterium, acts as the causative agent for several infections. Approximately, 15% of these infections, the CDC reports, are caused by multi-drug resistant strains that can lead to morbidity and mortality. The serious antibiotic resistant nature of the organism instigates pursuits for alternative treatments of *P. aeruginosa* infections. In our laboratory, we previously developed an iron-based acellular vaccine against *P. aeruginosa*. The vaccine is protective, targeting a main iron acquisition receptor in *P. aeruginosa*, known as FpvA. During our vaccine development against *P. aeruginosa*, we noticed a positive correlation between serum titers of FpvA-KLH vaccinated mice and protection against *P. aeruginosa*. Interestingly, during iron starvation conditions, we observed that heat-killed serum from FpvA-KLH vaccinated mice reduced the growth of *P. aeruginosa*. Blood serum proteins, like Antibodies, signal to immune cells invaders that can be targeted for destruction, but may also inhibit certain functions of marked cells. We hypothesize that antibodies produced against *P. aeruginosa* may inhibit important metabolic processes for the bacterium that we can take advantage of to develop a treatment for acute *P. aeruginosa* infections. We optimized a protocol to isolate antibodies produced against our vaccines and began testing them to understand their role during host clearance of infections. We identified and solved a set of technical issues for the detection of the purified antibodies and are now evaluating the uses of purified antibodies in an immunological setting. We hope to use these techniques to develop a new polyclonal antibody treatment against *Pseudomonas aeruginosa*.

**Funding:** Institutional (West Virginia University Vaccine Development Center)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #55**

Validation of biomechanical tools for assessment of locomotion

**Jackson Malone,\* Trevor Moon, Matthew Boots, and Anton Sobinov**

*1)Rockefeller Neuroscience Institute, School of Medicine, 2)Department of Human Performance, School of Medicine, 3)Department of Mechanical and Aerospace Engineering, West Virginia University, Morgantown, WV, USA*

**Field (Broad Category):** Medical Sciences (Health Sciences)

**Student's Major:** Mechanical Engineering

Individuals with locomotor deficits frequently suffer a decrease in quality of life when neural or musculoskeletal systems are damaged, often promoting comorbidities. Although current rehabilitative techniques can lead to functional improvements, they do not utilize the theories that capture the dynamics of the neural and mechanical components governing locomotion. Novel biomechanical tools (e.g. OpenSim) enable a complete examination of motor control mechanisms using musculoskeletal models. However, these models are inherently complex and require vigorous validation procedures to ensure proper limb dynamics. The goal of this project was to implement the two-step validation process previously developed for the hand and lower-arm musculoskeletal model for the leg. Our leg model combined two previous models to represent 14 degrees of freedom (DOF) and 43 musculotendon actuators spanning the hip, knee, ankle, and toe joints. The resulting model represented 104 muscle-DOF relationships. The first step in the validation process performed a structural validation of muscle paths by comparing simulated and experimentally determined moment arms for the full physiological range of motion. Here, we observe that moment arm profiles are sensitive to individual path adjustments and subsequently lead to significant changes in joint torques. After structural validation is complete, we will implement a functional validation check that will ensure the model's joint torques are physiologically accurate and realistic.

**Funding:** Federal (NIH/NIGMS 2U54GM104942-02)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Poster #56**

The Chemotactic Potential of Myeloid Derived Suppressor Cells during Murine Neonatal Sepsis

**Travis W. Rawson,\* Jordan Vance,\* and Cory Robinson**

*School of Medicine Department of Microbiology, Immunology, and Cell Biology, West Virginia University,  
Morgantown, WV, 26505*

**Field (Broad Category):** Medical Sciences (Health Sciences)

**Student's Major:** Immunology and Medical Microbiology

Neonatal sepsis is a major cause of infant mortality with global death toll estimates upwards of 3 million every year. Neonates have an immature immune system and consequently are more susceptible to infection. Myeloid derived suppressor cells (MDSCs) are a heterogeneous population of immature myeloid cells that exhibit immune suppressive activity and are more abundant early in life. MDSCs have been well described in the context of cancer, but much less is known about their role in acute bacterial infections. We hypothesize that MDSCs migrate to sites of infection during sepsis and compromise bacterial clearance. To better understand MDSC chemotaxis during infection, we first examined gene expression patterns of chemokines in infected peripheral tissues relative to controls. In the infected neonatal spleens, livers, and kidneys, expression of a number of chemokines were upregulated by PCR array. These included CXCL1, CCL7, CCL12, and CCL19, known to be ligands of chemokine receptors CXCR2, CCR2, and CCR7, and found on MDSCs. Gene expression patterns of the aforementioned chemokines observed in the array, were further validated by quantitative PCR. In MDSCs isolated from infected mice, there is a notable trend towards an increase in CCR7 expression. CXCR2 and CCR2 gene expression was stably maintained with little change during infection. Confirmation of the expression of these receptors at the cell surface is currently underway. These studies are shedding more light on the patterns of chemokine receptors expressed on MDSCs during infection, and the signals to which they are poised to respond.

**Funding:** Institutional (West Virginia University)

**Program/mechanism supporting research/creative efforts:**

Other

IMMB Undergraduate Research Internship

**Poster #57**

## Lung Inflammation After Carbon Black and Ozone Inhalation Exposure

**Lily Schelling,\* Narrita, Sherry Xie, and Salik Hussain***Department of Physiology and Pharmacology, School of Medicine, West Virginia University, Morgantown, WV 26506***Field (Broad Category):** Medical Sciences (Health Sciences)**Student's Major:** Immunology and Medical Microbiology

The World Health Organization (WHO) estimates that air pollution is among the five leading causes of mortality throughout the world. People living in urban areas inhale a mixture of particulate and gaseous pollutants. Ozone (O<sub>3</sub>) is among the most toxic components of the air pollution. Only a few studies have looked at realistic inhalation exposure to O<sub>3</sub> and particulates and none of them studied the mechanisms of lung inflammation. We hypothesized that a co-exposure to O<sub>3</sub> and particulates will synergistically increase lung inflammation. C57BL6/J mice (male and female) were randomly divided into different groups and exposed to CB, O<sub>3</sub>, CB+O<sub>3</sub> or filtered air (control) for three hours each day up to four days at the Inhalation Facility in West Virginia University. After sacrifice, bronchoalveolar lavage (BAL) performed and BAL cell fraction was separated by centrifugation, slides were prepared using Cytospin™, stained with Quick-Dip Stain and differential counting was performed. BAL fluid was analyzed for pro-inflammatory cytokine IL-1 $\beta$  using ELISA. Lungs tissue was collected for genes/protein expression or histology. A two to three folds increase in neutrophil counts were observed after co-exposure compared to ozone exposure. Moreover, there was a significant increase in lavage cytokine IL-1 $\beta$  after co-exposure compared to individual exposures. In conclusion, co-exposure induced significantly higher inflammatory responses in lungs compared to individual exposures. Further studies are underway to study the inflammatory pathways and cellular responses after inhalation exposures.

**Funding:** Not funded**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) &amp; accompanying HONR 297-level course

**Poster #58**

Changes in Myeloid-Derived Suppressor Cell function during neonatal sepsis

**Jordan Vance,\* Travis Rawson,\* Michelle Witt, Brittany Seman, Shelby Bradford and Cory Robinson**

*WVU School of Medicine, Department of Microbiology, Immunology, and Cell Biology, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Medical Sciences (Health Sciences)

**Student's Major:** Immunology and Medical Microbiology

Infants are more susceptible to infectious disease due to immaturity of the immune system. Our laboratory has shown that the immune suppressive cytokine, interleukin (IL)-27, is elevated in neonates. We and others have also shown that myeloid-derived suppressor cells (MDSCs) are more abundant in neonates. These cells are a source of IL-27 in neonates. MDSCs suppress immunity with additional effectors nitric oxide synthase (NOS2), arginase-1 (ARG1), and production of oxidative radicals. We hypothesized that MDSCs gain enhanced immune suppressive function during neonatal sepsis. We utilized a murine model of neonatal Escherichia coli-induced sepsis that demonstrates reduced weight gain in infected animals compared with controls, and high levels of bacteria in the blood and peripheral tissues. MDSCs were isolated from control or infected pups and the expression of effector function genes evaluated. Gene expression analysis revealed that NOS2, ARG1, and IL-27 gene expression was increased in MDSCs from infected mice. To understand whether these changes manifest at the protein level and if they could be replicated in vitro, MDSCs isolated from control mice were cultured with E. coli. A similar pattern of changes in expression was observed with NOS2, ARG1, and IL-27 genes in vitro when the MDSCs were cultured with bacteria. This was followed by increased arginase activity, elevated nitrite levels, and secreted IL-27. These results suggest gram-negative bacteria can directly act on MDSCs to enhance effector function associated with immune suppression. They also support further study of MDSC activity in regulating host control of infection early in life.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:**

WVU's SURE program

**Poster #59**

Alzheimer's disease infected mouse models exhibit a decrease in cognitive abilities after sepsis infection

**India Bender,\* Stanley Benkovic, Candice Brown, Divine Nwafor, and Allison Brichachek**

*Robert Byrd Health Sciences Center One Medical Center Drive Morgantown, WV 26506*

**Field (Broad Category):** Neuroscience (Health Sciences)

**Student's Major:** sociology

The brain is often seen as a self-contained organ, when in reality, the health of organs and the health of the body in general, have a great impact on the health of the brain. For example, as in the current study, sepsis has a great deal of impact on the overall cognitive health of mouse models as well as in clinical studies. Some of the impacts include a decrease in cognitive function, memory (short and long-term), and locomotion. The mouse model used in this study is characterized by an over-deposition of amyloid plaques in the brain. Sepsis is modeled through a cecal ligation and puncture procedure. The behavior of mice is then monitored after the surgeries. The brains are then harvested and stained using immunohistochemistry protocol where specific cell antigens are identified. We hypothesize that the mice that have not undergone cecal ligation and puncture surgery are more likely to exhibit normal behaviors as opposed to the mice who have undergone the surgery.

**Funding:** Private ('A State of Minds')

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #60**

Opioid Addiction Recovery Augmentation: Physiologically-Based Interventions

**Lilith McGhee,\* Scott Galster, Victor Finomore, and Dominic Raymond\***

*Rockefeller Neuroscience Institute, 8 Medical Center Dr, Morgantown, WV 26505*

**Field (Broad Category):** Neuroscience (Health Sciences)

**Student's Major:** Exercise Physiology- Pre Health Professions

As of 2017, West Virginia has had the highest drug overdose mortality per capita in the United States. To gain a better understanding of opioid use disorder (OUD), it is essential to understand the patterns of daily life which lead to substance use and observe patterns of abstinence and relapse by studying physiological, cognitive, and behavioral measures in everyday life.

Wearable devices will be utilized to gain insight into the patient's physiology inside and outside of the clinic to measure heart rate, sleep, and physical activity. Past studies have found consistent positive correlations between heart rate and drug craving reported by the patient in both a laboratory or clinical setting and the patient's natural environment. Namely, heart-rate variability increases with exposure to triggers and cues and cravings in those with substance use disorders as well as sleep abnormalities.

Patients with substance abuse disorders and poor cognitive task performance are at risk for poor treatment outcomes. Executive function cognitive tests will be administered daily through a mobile device to gain insight variability in results of the tasks. Also, a daily wellness questionnaire will be administered through the mobile device, allowing for the collection of subjective data about the patient's wellbeing. Collection of physiological, cognitive, and behavioral data via wearable devices in various settings will be useful to develop models predictive of relapse and inform therapeutic interventions for preventing relapse among opioid use disorder patients in recovery.

**Funding:** Federal (NIH)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #61**

Assessing the Prevalence of Cardiovascular Risks Among West Virginia Children with Health Conditions

**Grace Nowicki,\* Lesley Cottrell, and Matthew Epperly**

*Center of Excellence in Disabilities, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Nursing & Public Health (Health Sciences)

**Student's Major:** Public Health

Cardiovascular risk factors are indicators of future heart disease and cardiovascular risks include overweight, obesity, abnormal lipids, and hypertension. These risks can have similar effects on children as they do on adults and the trends regarding these risks have been steadily increasing. A child is considered overweight if they have a BMI the 85th percentile for age and sex, and the number of overweight children has tripled since 1980. Hypertension has increased by 10%, while over 40% of children have poor nutrition and diets leading to increased triglyceride levels. Over the past two decades, West Virginia has taken the lead in examining cardiovascular risks among children through the CARDIAC Project, where more than 10,000 fifth grade students are enrolled annually. Screening day includes a measure of height, weight, and blood pressure, as well as a fasting blood draw and a skin exam for Acanthosis nigricans (AN). The current study required secondary analyses of the CARDIAC Project results from 2004-2010 as children with one or more health conditions were compared to children with no health conditions. The CARDIAC project was created for all children; however, measures were frequently limited on children in wheelchairs. Nevertheless, the results emphasize a greater cardiovascular risk for children with one or more health conditions than those without. Next steps include devising a prevention and treatment plan involving more education for parents and children on the threats of cardiovascular risks, as well as lifestyle adjustments, such as better eating habits and physical activity plans.

**Funding:** Federal (The Administration for Intellectual and Developmental Disabilities)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #62**

Evaluation of a Guided Imagery Mobile Health Application for Pregnant Women

**Kelsey Kinnamon, \* Neel Rao\*, Madison Hill\*, and Dr. Peter Giacobbi Jr.**

*College of Physical Activity and Sport Sciences, 375 Birch St., P.O. Box 6116 Morgantown, WV 26505*

**Field (Broad Category):** Other (Health Sciences)

**Student's Major:** Sport & Exercise Psychology

Pregnancy is associated with many physical and psychological challenges that can lead to short- or long-term risks for mothers and their babies. Guided imagery is a mind-body technique involving visualization of mental images, and it has shown promising results with reducing health challenges experienced by pregnant women. The purposes of this 6-week, within-subjects, feasibility trial were to test the use, acceptance, and outcomes of a guided imagery intervention delivered through a mobile health (mHealth) application called Pregpal. Participants were instructed to listen to audio files that were titled Sleep and Relaxation, My Baby, Physical Activity, Eating Healthy, and Feel Great in a sequential order. We enrolled 58 participants (Mean Age = 28.5, pre-pregnancy BMI = 27.6) and usage data showed an average of 4.96 audio downloads per week. For study completers, the Sleep and Relaxation file was the most widely downloaded file (Mean Downloads = 5.72), followed by My Baby (Mean Downloads = 4.14) while the remaining files were downloaded with Means that ranged between 3.43 (Feel Great) to 3.65 (Physical Activity). Results of Wilcoxon signed rank tests of study completers showed significant reductions in depression, anxiety, and stress ( $\Delta = 2.02$ ,  $p = 0.0007$ ), sedentary behavior ( $\Delta = 10.39$  minutes,  $p = .0236$ ), preoccupation with complexion ( $\Delta = .32$ ,  $p = 0.0437$ ), and increased sexual attractiveness ( $\Delta = 0.40$ ,  $p = 0.0148$ ). Results provided support for the continued testing of Pregpal and efforts are under way to secure funding for larger scale efficacy testing and commercialization of the app.

**Funding:** Federal (National Science Foundation, National Institutes of Health, and the Centers for Disease Control and Prevention)

**Program/mechanism supporting research/creative efforts:**

Other

Work study (1st semester) and funded on grant (2nd semester)

**Poster #63**

Mixed Methods Evaluation of Freshman Transfers Out of Exercise Physiology

**Olivia Naylor,\* Randy W. Bryner, and Miriam E. Leary***Division of Exercise Physiology, Department of Human Performance and Applied Exercise Science, West Virginia University, Morgantown, WV 26506***Field (Broad Category):** Other (Health Sciences)**Student's Major:** Exercise Physiology

To determine undergraduate freshman's perceptions of the exercise physiology (EXPH) program and reasons for transferring. This mixed methods study used anonymous, online surveys administered at the start and end of the semester as well as private, one-on-one interviews. The exit interviews were led by a trained researcher and data were content analyzed for common themes. Data was compared between those freshmen who remained in EXPH versus those who transferred. Of the 247 freshman admitted to EXPH, data was obtained from 243. At the end of fall semester, 194 freshmen remained in the EXPH, while 49 transferred. At the start of the semester, compared with those that stayed in EXPH, freshman who transferred were less likely to feel EXPH would be extremely or very useful for finding work they enjoyed (96% vs. 84%); however, there were few between group differences. On the post-semester survey, there were significant differences in survey responses between freshman that remained in the program and those that transferred. Generally, while responses from transferred freshman were favorable, they were less positive than current students. Current students GPA ( $3.27 \pm 0.73$ ) was higher than those who transferred ( $2.63 \pm 1.07$ ) ( $p < 0.001$ ). Of the 34 freshman who participated in exit interviews, most left the program because of changes in career goals and academic difficulty, but had favorable impressions of the program and faculty. Despite leaving due to academic difficulty and/or professional aspirations, freshman transferring out of EXPH have favorable perceptions of the program.

**Funding:** Not funded (NA)**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) &amp; accompanying HONR 297-level course



## Session III (12-1:40 pm) – Human Engagement

### Poster #64

Incorporating the Great Wolf Lodge into West Virginia

**Samuel Dunmyre\* and Ajay Aluri**

*The Evansdale Crossings HIT Lab, West Virginia University, Morgantown, WV, 26506*

**Field (Broad Category):** Business (Business)

**Student's Major:** Hospitality and Tourism Management

One of the major objectives of West Virginia Forward is to increase tourism in the state to the leading industry and use it to promote livability. Looking at this we believe that opening a Great Wolf Lodge in the state of West Virginia will help to promote the states tourism. Looking at current data we plan on finding the optimal location to open this indoor water park and present this proposition. Through research we have decided to look at other existing locations of the Great Wolf Lodge as well as some of the other indoor water parks such as Kalahari, Splash Lagoon and others and create individual asset inventories for each location to compare to potentials location sites in West Virginia. While these sites range all over the country, we decided to mostly focus on those in the Northeast. Most of these properties are built close to large shopping outlets and some sort of amusement park or Resort and are located anywhere from 25 minutes to 1 hour 45 minutes away from a major US city. We believe that looking at these inventory assets we can find 3 comparable locations that we will then obtain the Smith Travel Research Data for and use that to compare those markets to our market when determining an ideal location.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

My efforts were mainly voluntary.

**Poster #65**

Piercing the Corporate Veil

**Alexander Owolabi\***

*101 Law School Dr, Morgantown, WV 26506*

**Field (Broad Category):** Law & Legal Studies (Business)

**Student's Major:** General Business

Two of the main types of businesses are Limited Liability Companies (LLC) and Corporations. An LLC is a entity structure whereby the members of the company are not personally liable for the company's debts or liabilities. Generally, the members have limited liability, meaning they can only lose what they have invested in the company and nothing more. LLCs are sometimes viewed as hybrid entities that combine the characteristics of a corporation and a partnership or sole proprietorship. A corporation is also a legal entity that is separate from its owners that grants them limited liability. Like LLCs, corporations enjoy most of the rights that an individual possesses, such as, the ability to loan and borrow money, sue and be sued, own assets and pay taxes. These two entities have distinct sets of rules that govern their operation. This research aims to find when LLCs are treated as corporation in veil-piercing cases. When the courts put aside limited liability and hold a corporation's shareholders or an LLC's members personally liable for the corporation's actions this is called "piercing the veil". Our research is exploring incidents of piercing the veil, and how these cases may affect future cases. This is being investigated by reading several thousand court cases and compiling the data. If a court pierces a company's entity veil, the owners (the shareholders of a corporation or the members of an LLC) can be held personally liable. This means creditors can go after the owners' home, bank account, investments, and other assets to satisfy the entity's debt. But courts will impose personal liability only on those individuals who are responsible for the corporation's or LLC's wrongful or fraudulent actions; they won't hold innocent parties personally liable for company debts.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #66**

Airline Dissolution

**Cornell Brown,\* Gulnara Zaynutdinova, and Olga Bruyaka Collignon**

*John Chamber College of Business and Economics Department of Finance, West Virginia University,  
Morgantown, WV 26506*

**Field (Broad Category):** Other (Business)

**Student's Major:** Marketing

The purpose of the study is to understand the behavior of investors and partners after a negative event has transpired in the airline industry covered by the media. Investors will make their decisions and the stock market is either stable or it declines. If the partnerships notice a negative market reaction, they might break ties with the airline company. This indirectly affects the probability of an unplanned alliance dissolution. A direct effect in the probability of an unplanned dissolution is when partnerships find the event to be too severe, or the reaction of the company is internally uncontrollable resulting in a loss in partnership. The important data within the project is the media's response to the event. There are many factors the study considers. The main things to look at in the media coverage results are how many articles were written about the event within each of the 7 days? Was the event an accident or incident, and who was held responsible? How severe was the event, and were the articles positive or negatively written? To figure out the indirect dissolution effect, one must figure out patterns in detail by recording the time of the event and how many articles were written 7 days after the event took place. The more negative articles written about the event, the greater chance there will be a decline in the stock price. This project will give investors and airline executives a better understanding about the relationships and investment strategies within the airline industry.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #67**

Perceived Advantages to Inclusive Programming in Music Therapy

**Maria Ducci,\* Katie Martin, Nicoletta Ciampa, and Dena Register**  
*College of Creative Arts, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Music/Music Therapy (Creative Arts)

**Student's Major:** Music Therapy

Research literature supports the effectiveness of inclusive programming which targets the integration of participants with and without disabilities in the same program to give each group experience interacting with the other. Unfortunately, most communities have extremely limited program options for children with disabilities that are not directly related to the school day, and even fewer extracurricular programs actively recruit students with and without a disability. Dreamcatchers is the first established inclusive program facilitating the practice of Music Therapy in the state of West Virginia. It was open to the public, and implemented learning through song, dance, and art. It was approximately eight months long. Interviews were held before and after the program had been completed with parents and participants. The authors will transcribe the responses, and the transcriptions will be compared and coded for trends. The purpose of this study was to determine trends in motivation for enrolling a child in Dreamcatchers, and whether it affected children's perceptions about interacting with someone that has a disability. Limitations of this study include the somewhat small data pool from which the results will be formed; therefore, repetition of this study in different locations could be beneficial for more generalized conclusions. Early results indicate that many guardians have registered their child into the program for an opportunity to gain socialization skills. Results of this study will be useful for the planning of inclusive programs in the future, particularly in small, rural communities.

**Funding:** Private (Mid-Atlantic Region of the AMTA)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #68**

Peer Feedback on Revisions & Implementation

**Joseph Ashton,\* Morgan Goode, and Melissa Patchan**

*Department of Learning Sciences and Human Development, College of Education and Human Resources, West Virginia University, 504M Allen Hall, Morgantown, WV, 26506*

**Field (Broad Category):** Education (Humanities)

**Student's Major:** Electrical Engineering

This current study hopes to understand what types of feedback yield the best results in revisions. Teachers, instructors, and peers who may need to know how they can give good feedback based on performance or writing in a particular situation. Better understanding peer review can help improve practical instruction across many fields. An increased understanding of peer revision would also better help students to improve their writing. It is hypothesized that comments that give summaries, have localized praise, and give solutions usually yield the best revisions in a person's performance or writing a second time. A correlational method is used to relate feedback types to different types of improvements or revisions. This is accomplished through different types of coding, comparison, and analysis of these comments. Altogether, these coding schemes and comparisons help us to better understand peer review and feedback, and how it can be better implemented to produce the most beneficial revisions in the classroom and in the real world.

**Funding:** Not funded (N/A)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #69**

Twitter Users and the Translation of Online Communication Into Real Life Discourse

**Shan Cawley\***  
*WVU English Department*

**Field (Broad Category):** English & Literature (Humanities)

**Student's Major:** English

This research paper explores the usage of Internet slang by Twitter users and how this interaction may transfer over into real-life conversation and everyday discourse. The question this paper wishes to answer is "Have social interactions between users on Twitter enhanced English's standard~vernacular continuum?" through a proposed hypothesis of "If specific communities on Twitter frequently use internet slang in their online content and communication, then this practice will translate into real life discourse." The language in this paper is not restricted by traditional writing, as it explores the use of emojis in this proposed online discourse as well. This paper expands and discusses ideas established in the following texts: *Language and the Internet* by David Crystal, *The Language of Social Media* by P. Seargeant and C. Tagg and *The Semiotics of Emoji: The Rise of Visual Language in the Age of the Internet* by Marcel Danesi. By using these texts as an academic foundation for research, this paper attempts to explore the question as to whether or not the language via Twitter users enhances English's standard~vernacular continuum. This research is sociolinguistically qualitative, as it uses samples from Twitter users' public accounts and surveys from Twitter users about the frequency of online phrases they use in their real lives.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**  
a WVU 497-level course

**Poster #70**

Italian American Women and Coal Miners in Denise Giardina's *Storming Heaven* and *The Unquiet Earth*

**Maddison Cook\***

*Eberly College of the Arts and Sciences Department of English, West Virginia University, Morgantown, WV, 26506*

**Field (Broad Category):** English & Literature (Humanities)

**Student's Major:** English

Denise Giardina's *Storming Heaven* and *Unquiet Earth* are historical novels that explore West Virginia and Kentucky coal miner's and their families' experiences, including the Italian American immigrant experience in Appalachia. Giardina's writings, overlooked outside of Appalachia, become important to narratives about the Italian American experience that focus outside of the criminal behavior that is written about in the northeast and Chicago. These novels take place in fictional southern West Virginia and northeastern Kentucky towns based on real towns and events. These novels offer a reflection of what life was like in Appalachia, specifically for those who worked in coal mines and the Italian immigrant women who married some of the Italian coal miners. Giardina's narratives give voice to an oppressed people in history. This research will use an in-depth exploration of hand-written manuscripts of both novels documented in the West Virginia & Regional History Center archives as well as the works from Italian American scholar, MaryJo Bona. MaryJo Bona's literary and cultural studies scholarship is important in helping me to identify stereotypes of Italian American women in literature and how and when those stereotypes are broken or expanded. The character of Rosa Angelelli, in Giardina's *Storming Heaven* is one of four narrators, yet her point of view is not included in a majority of the novel. The hand-written manuscripts are important to this study because they help investigate Giardina's background plotting for Rosa's and the Angelelli's families characters. They give insight as to why Giardina chose certain paths for these characters, and the actual history that influenced her.

**Funding:** Institutional (West Virginia University)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #71**

The Editing Process of Postmedieval

**Mikaela England\***

*Mikaela S. England, Department of Chemistry, Morgantown, WV 26505*

**Field (Broad Category):** English & Literature (Humanities)

**Student's Major:** English

Often, little information is given to undergraduate students wishing to publish their work in literary journals. The current study examines the editing process of works submitted to the Postmedieval journal of publication to assist students and professionals in their publication processes. Qualities of submission examined include correct grammar, concise word choice, correct format, correctly formatting references, using references, and overall readability. To gather this information, documents submitted to Postmedieval were edited for the previously mentioned components in order to give a better grasp of how the process works. The poster includes what the writer must do to submit their work as well as in-depth information about the components that are examined when editing. This is valuable information for undergraduates in many fields of study, showing them what they need to look for in their own papers. The information is equally as valuable for undergraduate students planning to go into editing, who will be shown some of what the job entails.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Poster #72**

Perspectives on the Benefits of Commonplace Books in the 21st Century Classroom

**Hannah Jack,\* and Kaley Vestal,\* and Thomas Sura**

*Department of English, 100 Colson Hall 1503 University Avenue P.O. Box 6296 Morgantown, WV  
26506-6296*

**Field (Broad Category):** English & Literature (Humanities)

**Student's Major:** English

Commonplace books, historically used as a popular method of knowledge expansion during the Renaissance era, have transformed over time to provide a student-friendly method of recording ideas in any discipline. Price (1980) suggests that commonplace books can reduce stress and improve attitudes surrounding writing. We hypothesize that this device can offer students a hands-on way to engage with course material and space to comfortably conduct research. We anticipate commonplace books enhance composition courses by facilitating deeper engagement with the material and improving knowledge transfer across disciplines. Our research develops an understanding of commonplace books' benefits in the 21st-century classroom by examining existing scholarship and experiencing this practice ourselves. We have created several commonplace books using various mediums, including Google Docs, Microsoft OneNote, journals, and binders. This research aims to: identify modern methods of creating commonplace books; record their benefits, particularly in the college composition classroom; and share this approach with others in order to gain further insight on its wide applicability.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #73**

Denise Giardina, Italian American Alienation in Appalachia, Experimental Writing, and Spatial Meaning

**Luis Neer\* and Nancy Caronia**

*Department of English, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** English & Literature (Humanities)

**Student's Major:** English

Research from the past year has focused on the Italian American and Appalachian novelist Denise Giardina (b. 1951), her novels *Storming Heaven* and *The Unquiet Earth*, and her context in the broader scope of Italian American women's literature. Giardina has been lauded as an Appalachian writer, but her establishment as an Italian American author is unclear. The researchers hope to explore and reconcile Giardina's position in pluralistic literary and cultural discourses. Methodology for research has included the study of Giardina's handwritten manuscripts in the West Virginia Regional History Center archives; reading and reviewing *The Dream Book*, the preeminent anthology on Italian American women's literature, edited by Helen Barolini; and other supplemental reading and writing. This semester's research has shifted to view Giardina's novels and archival material through the lens of "deep mapping," a recently developed lens in the humanities that seeks to synthesize geographic space with the layers of meaning embodied in places. This lens should prove useful for examining Giardina's work and how it relates to the literatures of Appalachia, womanhood, and immigrant experience.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

## Session III (12-1:40 pm) – Physical Sciences & Engineering

### Poster #74

A Cloud Based Entitlement Granting Engine

**Daniel Mancini,\* David Krovich and Austin Cottrill**

*Lane Department of Computer Science and Electrical Engineering, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Computer Science (Engineering)

**Student's Major:** CS/CpE dual major

Cyber Sandbox Software Portal (CSSP) is a web application built on the Ruby on Rails framework which provides an entitlement granting engine to assign AWS Instances to different users on demand. The motivation behind this effort is to create an easy way to give users access to virtual machines while also monitoring their work. CSSP would be useful in a classroom setting that requires hands on assignments and for students to have their own machines to work on. It would also be useful in training for cybersecurity competitions such as the Mid-Atlantic Collegiate Cyber Defense Competition. By utilizing the cloud and cloud programming API's, virtual instances can be allocated on demand which can not only save a huge amount of time, but also greatly reduce costs of setup, deployment, delegation, and usage of resources. CSSP will develop more industry ready workers in cybersecurity or computer science by providing an easier way to give students hands on training in a realistic environment.

**Funding:** Institutional (Lane Department)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #75**

Problem Solving Skills in Freshman Engineering Students Enrolled in College Algebra

**Pamela Saidoni\* and Lizzie Santiago**

*Stalter College of Engineering and Mineral Resources*

**Field (Broad Category):** Education (Engineering)

**Student's Major:** Computer And Electrical Engineering

Critical reasoning skills are essential to succeed in solving problems in the field of engineering. In this study, the investigators evaluated the problem solving skills of freshman engineering students enrolled in College Algebra. These students start in engineering with an academic disadvantage and take longer to complete a degree in engineering. Attrition is also higher in students that begin in engineering at the College Algebra level. To evaluate these students' problem solving skills, an assessment test consisting of fifteen questions was administered during their first semester at West Virginia University (WVU). The test measures students' ability to solve a variety engineering problems. Four questions from the test were analyzed using a rubric developed by the investigators. The rubric measured students' ability to identify the problem, present relevant information and/or equations needed to solve the problem, make appropriate assumptions and follow a logical procedure to find the solution to the problem. The rubric was developed based on the Paul-Elder theoretical framework on critical thinking. The analysis of the data, completed in 35 students, showed that students are able to identify relevant information and equations needed to solve problems. However, students' ability to understand the problem was found to have the greatest role in the capacity to correctly solve a problem. In training students to solve engineering problems, it is essential to focus on problem identification skills.

**Funding:** Federal (National Science Foundation)

**Program/mechanism supporting research/creative efforts:**

Other

Student worker

**Poster #76**

The Development and Integration of Air-Brake Systems on a Small-Scale Rocket

**Abednego Abdi\* and Dr. Patrick Browning**

*Abednego Abdi Department of Mechanical and Aerospace Engineering, West Virginia University,  
Morgantown, WV 26506*

**Field (Broad Category):** Engineering (Engineering)

**Student's Major:** Mechanical and Aerospace Engineering

The focus of the research conducted is to develop a passive and active air brake system to be utilized for launching an experimental rocket. The passive system will be designed so when a set of circumstantial data is met for the sensors, the system will deploy the braking mechanism automatically. The active system would be activated remotely at the desired instance for an individual by a switch. The systems will be designed composed of either purely mechanical components or electromechanical components depending on the efficiency of their design and use. The systems will be compared to one another through parameters including performance data, real-world applicability, construction costs, and failure conditions. Their integrability into the design of the rocket will play a major factor into the desirability of the design. Immediate efforts have revealed that the development of an active system over the passive system would be more plausible. The results of these findings can provide more precise rocket launches, as well as lay the groundwork for others interested in continuing the effort.

**Funding:** Institutional (NASA West Virginia Space Grant Consortium)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #77**

The Determination of the Burn Rate Characteristics of a Solid Rocket Propellant

**Daniel Bennett\* and Dr. Patrick Browning**

*Benjamin M. Statler College of Engineering and Mineral Resources Department of Mechanical and Aerospace Engineering, West Virginia University, Morgantown, WV, 26506*

**Field (Broad Category):** Engineering (Engineering)

**Student's Major:** Aerospace Engineering

The purpose of this study is to determine the burn rate characteristics of a known solid rocket propellant formula called Nevada Aerospace Science Associates (NASSA) Yellow 1.0C. The need for this study comes from the work of the West Virginia University Experimental Rocketry Team (WVUER) to design and develop experimental solid rocket motors. NASSA Yellow 1.0C was chosen to be characterized, since it is the main propellant of choice for WVUER and has been subject to a previous, unsuccessful characterization test conducted by WVUER. The burn rate characteristics of a solid rocket propellant can only be practically determined through empirical processes. In order to characterize NASSA Yellow 1.0C, a series of tests using Ballistic Evaluation Motors (BEM) will be conducted to obtain data on the burn rate of the propellant over a wide range of chamber pressures. Previous attempts to characterize NASSA Yellow 1.0C were made using BEMs with an outer diameter (OD) of 54mm. Tests conducted using 54mm OD BEMs, also referred to as 54mm BEMs, were mainly unsuccessful due to the small diameter of the motor chamber which constrained the allowable grain geometries of the motor and thus limited the range of chamber pressures at which the BEMs could operate. To prevent this from occurring, 75mm BEMs will be used for this new investigation. The results of this study could be used by WVUER to improve the accuracy and safety of their experimental motors and would provide an accurate framework for future propellant characterization tests conducted by WVUER.

**Funding:** Federal (NASA West Virginia Space Grant Consortium)

**Program/mechanism supporting research/creative efforts:**

Other

NASA West Virginia Space Grant Consortium

**Poster #78**

Deficiencies in Math Knowledge in ENGR Students Enrolled in College Algebra

**Diego Cabanillas\* and Lizzie Santiago**

*Freshman Engineering*

**Field (Broad Category):** Engineering (Engineering)

**Student's Major:** Petroleum Natural Gas Engineering

West Virginia University (WVU) accepts students in their Engineering program under three different tracks: track 1 with students that are calculus ready, track 2 with students that are currently enrolled in pre-calculus, and track 3 with students that are enrolled in College Algebra or Trigonometry. Students in track 3 tend to lack basic math skills and struggle in college. These students generally have a weak background in math, and therefore lack the problem solving skills necessary for engineering. The purpose of this study is to identify specific deficiencies in math knowledge in order to propose ways to help them improve their math skills in order to retain these students in Engineering. For this study, 100 students enrolled in College Algebra completed a pre- and post- assessment test aimed at measuring their critical thinking with different topics covering the basic essentials before moving on to higher engineering and math course. Deficiencies were found in this students' math knowledge, including simplify rational expressions, ability to solve quadratic expressions, and other fundamental skills needed before entering calculus. One of the main findings from this study is that there are common misconceptions that affect many students' abilities to solve and comprehend fundamental algebraic concepts. Future work may include the development of word problems to target engineering and math problem solving skills, the implementation of those problems in a freshman engineering course developed to target this student population, and the tracking the success of students enrolled in this course to evaluate the impact of these new changes.

**Funding:** Federal (National Science Foundation (NSF))

**Program/mechanism supporting research/creative efforts:**

My efforts were mainly voluntary.

**Poster #79**

How Acid Mine Drainage Affects Water Quality

**Kara Cunningham,\* Karen Buzby, and Lian-Shin Lin**  
*Benjamin M. Statler College of Engineering and Mineral Resources*

**Field (Broad Category):** Engineering (Engineering)  
**Student's Major:** Civil and Environmental Engineering

Water quality is imperative in our society because it ensures public health and maintains wildlife. Many factors affect water quality including anthropogenic activities such as coal mining. A headwater stream, West Run, is a tributary to the Monongahela River. West Run is impacted by acid mine drainage (AMD) due to the coal mines that were present in the 1900's. This project collected samples at the seven main stem and ten tributary sites to evaluate AMD impacts. After collection the samples were brought back to the lab and tested for variables including, pH, discharge, acidity, alkalinity, total suspended solids, the presence of certain ions and metals, and dissolved metals. The metals associated with coal mining are Fe, Mn, and Al, so these parameters were considered when interpreting data. Tributary sites such as Marion Meadows and Agronomy had high values of Fe and Al but low concentrations of Mn while RR-Fe had high concentrations of Mn. Main stem sites had lower metal concentrations because the tributary sites are closer to the AMD sources. Main stem sites are less affected by AMD because the AMD is diluted by surface water. From RR-Middle to Stewartstown the concentrations of Mn, Fe, and Al increase while the pH goes from 7.5 to 5.0. From Stewartstown to the Mouth of West Run Mn, Fe, and Al gradually decrease while pH gradually increases. The correlation between these values show how AMD is greatly impacting the water quality of the upper streams, but down stream sites are less affected.

**Funding:** Federal (The Appalachian Freshwater Initiative is supported by the National Science Foundation under Award Number OIA-1458952)

**Program/mechanism supporting research/creative efforts:**  
WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Poster #80**

The Weather Machine with Arduino

**Katie Digon,\* Jada Williams, \* and Dr. Yu Gu**

*Statler College of Engineerign and Mineral Research, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Engineering (Engineering)

**Student's Major:** Computer Science and Cyber Security

The current study, called Weather Station, aims to create an autonomous smart weather station which can accurate measure current weather conditions in real time. The lab focuses mainly on developing smart machines that utilize smart technology. The weather station uses adaptable technology that can be programmed, and pieces created in the lab group. The technology used is adaptable and can be easily switched out as the machines advance. The work focuses mainly on building the machines, programming them, and advancing the technology used in lab. The main research goal is to create technology that is smart and can make its own decisions. For example, the researchers are trying to implement a way for the weather machine to determine if it is in a rainy condition and to turn its rain gauge on of its own volition. The lab uses 3D printers, and Arduino products to develop the technology needed for the machines. The researchers do spend some time in the field as the machines needs to handle different conditions and terrains. The project is still in the developmental stage, and results are forthcoming.

**Funding:** Federal (Federal Work Study)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #81**

Tethered Drones for Extended Mission Time

**Erin Dodd,\* Kyle Dailyda,\* and Dr. Guilherme Pereira**

*Benjamin M. Statler College of Engineering and Mineral Resources, West Virginia University,  
Morgantown, WV 26506*

**Field (Broad Category):** Engineering (Engineering)

**Student's Major:** Mechanical Engineering

Drones are very effective tools that can be used in many applications that range from cinematography to precision agriculture. One particular limitation of drones is their short battery life. This problem is especially restrictive for drones being used in industrial and logistics applications. Although drones would be useful for retrieving packages and moving material in a warehouse, for example, they still require workers to change their battery periodically and must stop frequently for this purpose. The need for human labor to sustain drone labor and the constant pauses during work is counterintuitive for businesses - it is then important for the drones to be self-sustaining in those instances. This project will create a tethered drone which is capable of flying for as long as it is connected to a power supply. A software will be written in Robot Operating System (ROS) to control a mechanism which will wind and unwind the tether to adjust for flight path. The mechanism will also be developed in the project. The completed intelligent drone will be "plugged in" to the power supply and, by recognizing the constraints imposed by the tether on its flight, will be able to fly amongst other static obstacles and other tethered drones without tangling its tether or getting stuck in ground obstacles.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #82**

Conductivity of BZCYYb Protonic Ceramic Fuel Cell Materials

**Ellena Gemmen,\* Bryan Jackson, and Dr. Xueyan Song**

*Department of Mechanical and Aerospace Engineering, Benjamin M. Statler College of Engineering and Mineral Resources, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Engineering (Engineering)

**Student's Major:** Mechanical Engineering

In order to increase the applications and market penetration of sustainable energy technologies such as wind energy generators and solar photovoltaic generators, the operation temperature of fuel cells must decrease so as to increase the lifetime of the fuel cell. Though protonic ceramic fuel cells (PCFCs) are being examined as an alternative for high-temperature solid oxide fuel cells (SOFCs), their present low stability and poor sinterability has suppressed advancement in comparison to SOFCs. In response to recent publications examining high performing PCFCs, where the cathode is comprised of PBSCF and the electrolyte is comprised of BZCYYb, we have reproduced the cathode and electrolyte materials but exposed them to conditions that were previously not examined by the original publication. We also applied a tape-casting method to the electrolyte in order to increase the manufacturability of PCFCs. Total conductivity measurement results from tests of these materials at temperatures between 44 deg. C and 800 deg. C in air are reported in this presentation.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #83**

Smart Manufacturing with Augmented Reality Technology

**Joshua Gross,\* Joseph Sullivan,\* and Thorsten Wuest**

*Benjamin M. Statler College of Engineering and Mineral Resources, West Virginia University,  
Morgantown, WV 26506*

**Field (Broad Category):** Engineering (Engineering)

**Student's Major:** Mechanical Engineering

As technology develops, manufacturers desire to utilize the newest and most effective innovations of the age. The emergence of Augmented Reality (AR) is on the horizon and will likely become more ingrained in the way society operates and does business. The purpose of the Smart Manufacturing Lab at WVU is to develop software and hardware integrations that can improve the efficacy and profitability of industrial manufacturing processes, to drive innovation in theory and application. One such way of increasing efficiency could prove to be the adoption of AR technology for workers in factories that are enabled with intelligent devices and sensors (operator 4.0)—under the umbrella of current manufacturing initiatives commonly known as Smart Manufacturing, Factories of the Future, or Industry 4.0. The aim of this project is to develop software for a hardware peripheral headset, or Smart Glasses, that will be useful in industrial environments as a way to improve problem identification, worker satisfaction and safety, and the monitoring of integral processes. This is done by integrating hardware data collection, software applications, and wireless data transmission to collect, manipulate, interact with, and display useful information in regard to a model industrial assembly line constructing model cellular devices directly in the field of vision of the operator.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #84**

Reviewed Vicon Error Analysis

**Joshua Heagy\***

*Benjamin M. Statler College of Engineering and Mineral Resources*

**Field (Broad Category):** Engineering (Engineering)

**Student's Major:** Aerospace/Mechanical Engineering

Various forms of raptors and other birds of prey have been apex predators in many ecosystems throughout earth's history, suggesting inherent characteristics about a bird of prey's ability to maneuver that impact their effectiveness as a predator. In this research we hope to capture such truths about the secrets behind avian flight paths in order to draw connections towards more efficient unmanned aircraft design. Current research is conducted with the analysis of error of new Vicon System optics and cameras. These cameras are highly precise and will reflect the greatest information when analyzing video data and motion tracking data of birds in flight. We expect to analyze a very particular margin of error with the Vicon System cameras that will suggest reliability in Vicon cameras to collect the motion data later in the lab. When total error analysis is complete. Field testing can be pursued with the analysis of birds of prey taking flight equipped with markers that will track their motion and position across time. This data will provide greater insight as to which locations relative to the flight body's airfoil to produce reactions and other dynamic forces that will result in higher maneuverability and efficiencies.

**Funding:** Other

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #85**

Fabrication of Kirigami based structures for flexible electronics applications

**Xochitl C. Hernandez,\* Muriithi-David Githui Kem, Derrick Banerjee and Konstantinos A. Sierros**  
*Department of Mechanical and Aerospace Engineering, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Engineering (Engineering)

**Student's Major:** Mechanical and Aerospace Engineering

Direct ink writing, a process in which a filament of a paste is extruded from a small nozzle while the nozzle is moved across a platform, is a technique that allows to the manipulation of the elastomer, polydimethylsiloxane (PDMS). This technique combined with kirigami, the Japanese art of paper cutting and folding, enables the development of flexible, custom parts. Parts are designed with the intention of becoming actuators or sensors induced by electrical current or magnetic field. Ideally, the structures printed become an actuator, a mechanical piece that allows movement in multiple directions, or become sensors. Integrating metallic particles in various manners is one way of developing these sensors. Some methods of this integration include direct deposition, placing particles directly into PDMS, and sputter coating (physical vapor deposition process used to apply a very thin, functional coating on a substrate). By incorporating conductive materials into the PDMS, there is a pathway for electrical current to flow and this flow can be used with electronic devices. The purpose of these parts is to advance the field of soft robotics and ease the design complexity within electronic devices.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #86**

Subsurface modeling and well configuration design for deep direct-use geothermal development at WVU

**Victoria Irr,\* Nagasree Garapati, Yingqi Zhang, Pierre Jeanne, and Christine Doughty**

*1Department of Chemical and Biomedical Engineering, Benjamin M. Statler College of Engineering and Mineral Resources, West Virginia University, Morgantown, WV 26506*

*2 Lawrence Berkeley National Laboratory, Berkeley, 1 Cyclotron Rd, Berkeley, CA 94720*

**Field (Broad Category):** Engineering (Engineering)

**Student's Major:** Chemical Engineering

The Morgantown campus of West Virginia University (WVU) affords an optimal and unique combination of critical factors necessary to develop the first geothermal deep direct-use district heating and cooling (GDHC) system in the eastern United States. Temperature and flow rate were identified to be the two most critical factors in minimizing the cost of geothermal energy in the 2006 MIT Future of Geothermal Energy Report. For Morgantown, the subsurface uncertainty is dominated by uncertainty in the fractured rock, which propagates to the uncertainty in the projections of geofluid flow rate and temperature breakthrough time in the target formation, the Tuscarora Sandstone. Potential Tuscarora geological model was build based on core analysis and permeability measurements using data from nearby wells. A geological model is then translated into a reservoir model. iTOUGH2/EOS1 is used to simulate two well configurations: 1) a pair of vertical wells, and 2) a pair of horizontal wells and the uncertainties related to production. The performance of both configurations is evaluated based on achievable flow rates and production fluid temperatures. Since the geothermal gradient for the site location is not confirmed, based on preliminary thermal resource assessment a range of 25-30°C/km is used. Also, the fracture distribution and orientation is not available, so sensitivity analysis is performed by building models with various heterogeneous permeability using iTOUGH2-GSLIB. Results indicate that the thermal breakthrough and production flow rate for horizontal wells is higher than vertical wells. These results from numerical modelling will help in designing the optimum well configuration.

**Funding:** Federal (U.S. DoE Office of EERE under the Geothermal Technologies Office, under Award Number DE-EE0008105)

**Program/mechanism supporting research/creative efforts:**

WVU's SURE program

WVU 498 course

**Poster #87**

Development of an Inexpensive Torque-Limiting Package for Hobby-Grade servos

**Tucker Johnson\***

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**Field (Broad Category):** Engineering (Engineering)**Student's Major:** MAE

Inexpensive hobby-grade servos are readily available online, frequently for less than \$5 per servo. However, similar sized industrial-grade servos can frequently run a price tag of several hundred dollars. This projects attempts to increase the functionality of hobby-grade servos by developing a stand-alone package able to easily sense, and control, the output torque. with a focus on remaining inexpensive, using parts that can easily be acquired, and easily integrated into systems already using hobby-grade servos. The package is built around an 3rd party Arduino board(Tensey 3.6), which interfaces with additional components(such as a(n) LM317, MCP4131, and ACS723) to control the torque output of the servo. The Arduino board measures the current to the servo, and uses this to calculate the current torque output (using previously-gathered data about the linear relation). If this output is above or below the set torque limit at any instant, the Arduino can decrease or increase the voltage to the servo to compensate. These electronics are soldered to perfboard, and enclosed in a 3D printed case. The end cost of such a package is estimated to be \$30, but this could reach as low as \$10 with further optimization and specialization of components.

**Funding:** Institutional (NASA West Virginia Space Grant Consortium, West Virginia University)**Program/mechanism supporting research/creative efforts:**

Other

WV Space Grant



**Poster #88**

AUTONOMOUS QUADROTOR HARDWARE TESTING

**Emily J. Kearney,\* Eric Babyak, Stan Mohler, Jon Yasurek, Alec Engell, Dr. Patrick Bowning, Dr. Christopher Griffin, and Hunter Dalton\***

*E. Kearney Department of Mechanical and Aerospace Engineering, West Virginia University,  
Morgantown, WV 26506*

**Field (Broad Category):** Engineering (Engineering)  
**Student's Major:** Mechanical Engineering & Physics

The IMAGRS project sought to design the necessary hardware and software for an autonomous quadcopter with unique mission components. The battery development process concluded with three final applications for an annular lithium polymer power source: a charging pad, battery swap, and in-flight charging. Quadrotor batteries available for purchase are quite limited in geometry and require further testing to receive performance data. In order to meet project requirements, the rectangular products available did not interface with the mission hardware and volume requirements. Therefore, using structural battery techniques allowed the power source to interface well with the mission hardware. As a result, the annular lithium polymer design was integrated into the design sitting at the base of the aircraft. This has allowed an analysis of performance and cost to occur using the three methods of charging outlined above. The three options balance the need for a reduced charge time, minimal precision in aircraft landings, and reliability. Currently, the charging pad requires the largest charge time and requires a precision landing, but it offers reliability through its widely-used technology and simple application. The battery swap minimizes the charge time, but it requires a high precision landing to a degree greater than the charging pad. Lastly, the in-flight charging poses a minimal charge time, but its recent technology provides little support and poses a high cost to the project budget. Due to these factors, the battery design will undergo an in-depth constructive phase in order to meet the required standards of performance.

**Funding:** Federal (Department of Defense)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #89**

Improving Accuracy of Automatic Neuronal Tissue Segmentation

**Liam McGoldrick\* and Gianfranco Doretto**

*Lane Department of Computer Science and Electrical Engineering*

**Field (Broad Category):** Engineering (Engineering)

**Student's Major:** Electrical Engineering

Advances in neuroscience have led to the generation of large image volumes of brain tissue. The end goal of this data collection is to study the connections between the neurons in those volumes to provide deeper insights into brain functions. This requires segmentation of raw images to extract neuronal cells and reconstruct their network. While in the past, the task has been attempted by deploying teams of human annotators segmenting images by hand, current sheer volumes of data to be processed require the use of automated solutions. Recent advances in machine learning have enabled the development of new automated segmentation techniques. While some of them exhibit promising accuracy, they are designed to work effectively only on certain types of data. One strategy to improve the performance is to make those techniques less sensitive to the data they operate on. We do so by using so called domain adaptation techniques to train the machine learning algorithms to become robust to biases in the data. We show that doing so increases the segmentation accuracy of electron microscopy images of brain tissue.

**Funding:** Other

**Program/mechanism supporting research/creative efforts:**

My efforts were mainly voluntary.

**Poster #90**

Compiling Previous UAS Data to Predict Future Implications

**Nathan Musser\* and Patrick Browning**

*Benjamin M Statler College of Engineering and Mineral Resources*

**Field (Broad Category):** Engineering (Engineering)

**Student's Major:** Aerospace and Mechanical Engineering

In today's ever-expanding community of unmanned aerial system (UAS) end users, there is a distinct need for more and better performance trend analyses for different types of drones. The team has researched different yearly catalogs that contain data detailing the specifications of various drones of all flight types. The team then gathered this data and entered it under numerous categories in a Microsoft Excel spreadsheet. After collecting and analyzing this manufacturer data, the team used MATLAB to compile the data into multiple trend lines that relate the statistics of a drone of one flight type to one another of that same type. This research can help the general public understand what components they need to create a drone that will accomplish the goal they desire. This work also investigates the state of the market as well as the historical details of various small unmanned aerial systems to develop a better understanding of UAS performance today as well as anticipate the capabilities of future systems.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

## Session IV (1:50-3:30 pm) - Agricultural & Environmental Sciences

### **Poster #1**

Lipid Modification of Hedgehog Protein and its Significance in Polyphenic Development of Beetle Horns

**Bennett A. Yunker,\* Logan Zeigler, and Teiya Kijimoto**

*Department of Plant and Soil Sciences in Davis College, West Virginia University, Morgantown, WV  
26506*

**Field (Broad Category):** Biology (Sciences)

**Student's Major:** Biochemistry

In *Onthophagus taurus* (*O. taurus*), horn development is a polyphenic trait responding to different nutritional levels, resulting from the co-option of two genetic pathways; doublesex (*dsx*) which encodes a transcription factor pivotal in sex determination, and hedgehog (*hh*) which encodes a morphogen that serves as a major regulator for developmental genes. We aim to pinpoint which/where nutritional factors influence the expression of those pathways. We theorized that the modifications of the Hedgehog protein by lipids play important roles in increasing the intensity of Hedgehog signaling itself. Palmitate is one such lipid that the acetyltransferase enzyme, Rasp, mediates the modification onto the N-terminus of the Hh molecule. To investigate whether the Hedgehog pathway is influenced by nutrient intake (via lipid availability) through the modification of the Hh molecule, palmitate was restricted from modifying the Hh molecule via rasp knock-down. This knock-down would mirror the effects of a system lacking the proper levels of palmitate to be allocated for horn development and allow insight into the impacts of such stress. Preliminary observations have shown rasp knock-downs often resulted in maldevelopment (holes) in their elytra not seen in control injections, suggesting that Rasp may play a role in development and regulation of other functions within *O. taurus*. Our data also suggests that horn development was increased, which is comparable to results seen in *hh* knock-down experiments. Due to the resemblance with the results of *hh* knock-downs, it is likely that palmitate's modification of the Hedgehog signaling molecule is vital to maintaining its function.

**Funding:** Federal

**Program/mechanism supporting research/creative efforts:**

My efforts were mainly voluntary.

**Poster #2**

Looking Inside WVU's Local Volcano: X-Ray Imaging of the Masontown Kimberlite

**Brenna G. Cole,\* Graham D.M. Andrews, and Sarah R. Brown**

*Department of Geology and Geography, West Virginia University, Morgantown, WV, 26506*

**Field (Broad Category):** Geography/Geology (Sciences)

**Student's Major:** Geology

Kimberlites are an uncommon volcanic rock erupted from the deep mantle as a turbulent mix of CO<sub>2</sub> gas, molten kimberlite, and mineral fragments; they are also the primary source of diamonds. Kimberlites are known to entrain minerals (xenocrysts) and rock fragments (xenoliths) from the surrounding mantle rocks. How the fragments are generated, introduced to the molten kimberlite, and transported towards the surface can be investigated by examining their morphologies and sizes. We examined samples from a kimberlite from Masontown, PA, to characterize the number, morphology, and sizes of peridotite xenoliths and olivine xenocrysts. Samples supplied by the Smithsonian Institute and Mr. Henry Prellwitz were analyzed by traditional optical methods at WVU and by industrial computed X-ray tomography (iCT) scanning at the National Energy Technology Laboratory (NETL) in Morgantown. The iCT data are processed using image analysis software (Fiji, Ilastik, and Blob 3D) to digitally separate the xenoliths and xenocrysts before they can be measured. CT imaging of kimberlite is very challenging due to the lack of contrast between fragments and rims that results from their similar compositions. We have developed a workflow to maximize contrast and to discriminate between fragments, but the process is slow, requires constant user input, and is computationally demanding. Preliminary results show that fragments are very rounded and often rimmed by a thin, lighter colored jacket. This implies that the fragments were transported in a turbulent fluid before being soaked in molten kimberlite. This interpretation is the same as reached in the very few previous textural studies.

**Funding:** Other (Andrews' Faculty Start-Up Grant)

**Program/mechanism supporting research/creative efforts:**

Other

Senior Thesis

**Poster #3**

Urban Legacies: Linking Glass Manufacturing to Soil Pollution in Morgantown, WV

**Kailee Gokey,\* Chase Mowery,\* Erin Mates,\* Randy Toth, and Ken Brown**

*Department of Geology & Geography, Department of Mining Engineering, and Division of Plant and Soil Science, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Geography/Geology (Sciences)

**Student's Major:** Geology

Heavy metal contamination in urban environments is a growing public health concern. Characterizing the distribution and concentrations of these elements allows researchers to better educate and warn residents of the potential health risks. Glass manufacturing processes often utilize heavy metals (e.g., Cr, Pb, U, Co, Cu, Zn) to generate an array of vibrant colors. Morgantown, WV has a long history of glass manufacturing that included the Beaumont Glass, Quality Glass, and Seneca Glass companies. While the Seneca Glass building still stands, both Beaumont and Quality Glass were named Brownfield sites after production at these factories ceased. This study aims to investigate the distribution and concentrations of heavy metal within the Brownfield site, formerly occupied by the Beaumont Glass factory. We hypothesize that this Brownfield site continues to be impacted by heavy metal contamination. Seventeen samples, including soil, glass, and slag, were collected from the site and analyzed for their heavy metal concentrations (Cr, Ni, Cu, U, V, and Zn) using a handheld XRF spectrometer (p-XRF). Field observations indicate that slag and glass fragments are still present on the property. Our results also reveal that elevated concentrations of these metals continue to exist despite previous remediation efforts. The highest concentrations were observed at sample locations near the southeastern end of the property. Our observations and data indicate that the Brownfield site remains contaminated with heavy metals and future remediation efforts are warranted.

**Funding:** Other

**Program/mechanism supporting research/creative efforts:**

Other

Senior Geology Course/ Environmental Geoscience Capstone

**Poster #4**

Deconstructing and Reconstructing Volcanic Layering to Understand How Coring Techniques Disturb Stratigraphy

**Emma T. Krolczyk\* and Graham D.M. Andrews**

*Department of Geology and Geography, Morgantown, WV 26505*

**Field (Broad Category):** Geography/Geology (Sciences)

**Student's Major:** Geology

Submarine and terrestrial volcanic eruptions produce a nearly complete geological record when deposited in the ocean away from effects of weathering, erosion, and chemical alteration. These tephra deposits are routinely sampled by scientific coring by International Ocean Discovery Program (IODP) research cruises. Their data is critical in understanding long-term volcanic and climate changes. Coring techniques often fail to collect all samples equally well, unconsolidated pumice is particularly susceptible to disturbance and incomplete sampling. This is because the pumice clasts float and are non-cohesive. When penetrated and disturbed by coring, the pumice layers disaggregate and float within the water-lubricated coring system. The result is that pumice-rich layers are often incompletely sampled and their original structures are often destroyed or variably modified. In losing those original structures, geoscientists lose critical information about the number, composition, and thickness of layers. We have deconstructed a disturbed pumice-rich core from IODP Expedition-350 to understand how complex stratigraphy is homogenized by coring disturbance in order to attempt to reconstruct the original pumice distributions. We have measured the grain size distributions of equally-spaced pumice-rich intervals within a single, thick homogeneous layer, then allowed each sample to sink in a water column to understand the type of incremental deposit that should be present. Finally, we recombined the disturbed deposit and allowed it to sink to recover the ideal pattern if it were originally one deposit. Preliminary results show that the homogeneous layer is composed of multiple pumice populations that must have originated as discrete layers from individual eruptions.

**Funding:** Other (Andrews' faculty start-up grant)

**Program/mechanism supporting research/creative efforts:**

Other

Senior Thesis

**Poster #5**

How Did the Fraser River Basin Respond to Reversal: a Terrain Analysis

**Charlotte E. Lilly \* and Graham D.M. Andrews**

*Department of Geology and Geography, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Geography/Geology (Sciences)

**Student's Major:** Geology

The Fraser River Basin in British Columbia, Canada, is inferred to have experienced a drainage reversal between 1.06 and 0.76 Ma. Such a reversal would have changed the flow of the river from northward to southward and changed the gradient. Volcanic dams along the Fraser River and its tributaries provide both timemarkers and a benchmark to measure the river level when they formed. However, lava dams are small and localized, so to extrapolate across the basin it is necessary to track the ancient valley floor from topography. We achieve this by drawing topographic profiles across the Fraser River and its major tributaries throughout the Basin. Where a profile intersects with the location of a volcanic dam we can constrain the minimum age of that surface. Using Google Earth to initially locate profile lines and then transferring them to QGIS it is possible to extract the highest resolution elevation profile possible. Preliminary results show that the difference between the modern and ancient valley floor along the Fraser River gradually increases southwards, in agreement with reversal from north-flowing to south-flowing. Conversely, the tributaries have very abrupt changes in the difference between ancient and modern valley floors only near their confluences with the Fraser River. The maximum difference is greatest in tributaries at the present-day downstream end of the Fraser River (south) and less back upstream. This suggests that the change in river level, and hence the reversal, was recent and very rapid: in other words, probably not a gradual process.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

My efforts were mainly voluntary.

GEOL 496 Course



**Poster #6**

Geospatial Analysis of Heavy Metal Concentrations of Beaumont Glass Factory in Morgantown, WV

**Andrew T. McGrady,\* Kenneth L. Brown, and Aaron Maxwell**

*Department of Geology and Geography, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Geography/Geology (Sciences)

**Student's Major:** Geology

Anthropogenic activity (activity caused or influenced by humans), especially in the chemical and manufacturing industries, has long been known to cause contamination to the soil in the surrounding area. Soil contamination can pose a hazard to humans and flora in the area, as well as the groundwater and surface water if there is a direct corridor for the contamination to spread. Seventeen soil samples from one Brownfield site in Morgantown, WV, the abandoned Beaumont Glass factory, show elevated concentrations of heavy metals (Cr, Cu, Ni, U, V, Zn) in the soils along the perimeter of the property. The Inverse Distance Weighting method, a geospatial statistical analysis technique, will be employed to interpolate heavy metal concentrations in soil across the entire property of the old Beaumont Glass factory, the study area, to assess the hypothesis that the largest portion of contamination occurred in the southeast part of the property, where the melter, ovens, oil tanks, and chemical storage were once located.

**Funding:** State (NASA WV Space Grant Consortium)

**Program/mechanism supporting research/creative efforts:**

a WVU 497-level course

**Poster #7**

Topographic effects on Tree Size and Species in Central WV

**Ben Mountain,\* Brenden McNeil, Brittany Casey, Danielle Canning, and Molly Sherlock**  
*Eberly College Department of Geology & Geography*

**Field (Broad Category):** Geography/Geology (Sciences)

**Student's Major:** Environmental Geoscience

Different species of trees have adaptations that can help them be more successful in certain topographic environments. Testing the relationship among topography and species can help refine our ability to understand the roles forests play in sequestering atmospheric CO<sub>2</sub> and mitigating climate change. To test the relationship between species and topography in WV, I helped map 1750 trees within a large gridded plot in the Summit Bechtel Family National Scout Reserve located in Fayetteville, WV. For each tree, we identified its' species, measured its' size (i.e. diameter at breast height), and mapped the bearing and distance to each tree from a surveyed corner of the plot grid. After using these field measurements to create a digital map of the forest tree species composition and tree sizes, we used a Geographic Information System to test whether certain parts of the landscape contained different tree sizes and different tree species. We specifically used a digital elevation model and a water balance model to identify how topography creates wet and dry portions of the landscape. By testing, for example, if red maple trees are more abundant and larger on wet parts of the landscape (e.g. stream drainages), we can help refine predictions of forest growth and atmospheric CO<sub>2</sub> sequestration under a changed climate.

**Funding:** Institutional (West Virginia University)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #8**

The Distribution and Concentration of Heavy Metal Contaminants among Public Playgrounds in Morgantown, WV

**Rhiannon R. Schmitt,\* Kenneth L. Brown, Hannah J. Veldhuizen, and Jennifer C. Latimer**

*Department of Geology & Geography, West Virginia University, Morgantown, WV 26506; Department of Earth & Environmental Systems, Indiana State University, IN 47809*

**Field (Broad Category):** Geography/Geology (Sciences)

**Student's Major:** Geology

Investigating the distribution and concentration of heavy metals in urban environments is critical for protecting the health and safety of residents. These contaminants can result in a range of health issues depending upon the level and duration of exposure. Although acute doses of harmful metals such as Pb and Hg are highly toxic, it is now becoming evident that chronic exposure to low levels of these elements can also cause long-term health problems. This research examines the spatial distribution and magnitude of heavy metal contaminants (e.g. Pb, Cr, Cu, and Zn) within soils located in Morgantown, WV. Because children are generally more sensitive to these metals, this project focuses on playgrounds and other public areas. Soil samples were collected from 11 locations and analyzed by p-XRF (handheld XRF). New p-XRF data indicates heavy metal concentrations typically decrease with increasing distance from the city's center. The highest concentrations are observed in the Core Arboretum. Additional samples were collected within the Core Arboretum to investigate how concentrations vary with increasing distance from a major roadway. In general, we observe that concentrations decrease with increasing distance from the road. All samples are below the EPA recommended thresholds (i.e. Pb - 400ppm, Cr - 3000ppm, Zn - 7500ppm, Cu - 4300ppm), indicating that no immediate remediation actions are necessary. However, chronic exposure to these low levels may pose a future health concern for residents. Potential sources of these elements are unclear, but likely reflect traffic patterns, past coal-burning operations, and industrial activities.

**Funding:** Other

**Program/mechanism supporting research/creative efforts:**

My efforts were mainly voluntary.

**Poster #9**

Geochemical Mapping of Soil Contaminants in Reedsville, WV

**Brendan Smith,\* Randy Toth, and Ken Brown**

*Department of Geology & Geography, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Geography/Geology (Sciences)

**Student's Major:** Geology

Human activities can dramatically disrupt the natural landscape by modifying waterways, increasing particulate matter in the atmosphere, and altering the transport and storage of important soil nutrients. These activities can have a lasting impact on the health of residents, animals, and the environment. This study investigates soil contamination within Reedsville, WV, which was home to an array of manufacturing activities that spanned from the early 1950's to the late 1980's. In 2006, the Environmental Protection Agency (EPA) and the West Virginia Department of Environmental Protection (WVDEP) analyzed soil samples from the Reedsville area and discovered elevated concentrations of lead (Pb - 5,000 ppm) and copper (Cu - 66,000 ppm). These values far exceed the EPA thresholds for these elements (400 and 500 ppm, respectively). This was documented in a report by the Agency for Toxic Substances and Disease Registry (ASTDR). Remediation efforts by the EPA resulted in the removal and replacement of heavily contaminated soils and sediments. However, given the distribution of these contaminants in the area, we hypothesize that this issue still persists. Geochemical soil mapping is one of the primary tools used to identify the distribution of these harmful contaminants such as those found in Reedsville, WV. This study has identified 30 targeted locations for geochemical analyses. These analyses can be used to confirm the persistence of these heavy metals in the area. The results and conclusions of this work will be used to inform residents within the Reedsville community.

**Funding:** Other (Discretionary Funds)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #10**

Water Monitoring within an Urban Watershed: West Run's Steam of Many Colors, Morgantown, WV

**Jayden Ware,\* Micah Crewdson,\* Tanner Lambert,\* Matthew Bell, and Ken Brown**  
*Department of Geology & Geography, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Geography/Geology (Sciences)

**Student's Major:** Geology

Humans depend on water to meet a wide array of needs that include consumption, hygiene, and recreation. Because of water's vital importance, contaminated water can lead to health issues such as water-borne diseases, poisoning, and death. The streams in this project are points of interest because three independent water sources converge, forming West Run, a stream that flows through an urban area and empties into the Monongahela River in Downtown Morgantown, WV. Because of its urban setting and large drainage area, these three water sources have the potential to negatively impact a large portion of Morgantown's residents. Each tributary has its own unique appearance, varying in color from red-orange and milky white to dark green/black. Each stream also has an unhealthy chemical composition that includes extreme levels of E. coli and Coliform bacteria, elevated dissolved solids, and unnatural pH. Weekly water samples were collected and analyzed from each stream over the period of one month during the fall of 2018. This was done to better understand the contributions each of the three stream sources has on West Run's overall water quality. Despite the limited duration of our study, we have identified potential point sources and nonpoint sources that could be impacting the water quality in these streams. Potential sources include acid mine drainage from surrounding coal strip mines, stormwater and agricultural runoff, interstate I-68 drainage, and outdated client owned sewer systems. Many of these sources are common to other watersheds in West Virginia.

**Funding:** Other

**Program/mechanism supporting research/creative efforts:**

Other

Senior Geology Course/ Environmental Geoscience Capstone

**Poster #11**

How long do Mississippi River fishes live?

**Linsey A. Fain,\* Hae H. Kim, Quinton E. Phelps, Colby G. Gainer, and Ethan A. Rutledge**  
*Division of Forestry and Natural Resources, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Natural Resources/Wood Science/Plant Science (Sciences)  
**Student's Major:** Wildlife and Fisheries Resources

Fish encompass the highest diversity (>34,000 species) among vertebrates. In North America, temperate freshwater organism diversity is high. However, anthropogenic impacts have threatened these aquatic ecosystems. The Upper Mississippi River has over 140 species across a wide breadth of life-history traits. There are a variety of life-history strategies (e.g., opportunistic) across fishes. Various life-history strategies have a major influence on fish longevity. Some fish exhibit relatively short life-spans (e.g., Coral Reef Pygmy Goby, lives ~60days) while some exhibit relatively long life-spans (e.g., >200 year old Greenland Shark). Age data is important for quantifying vital rates. Vital rates (i.e., recruitment, growth, and mortality) are important population parameters. The Freshwater Drum, *Aplodinotus grunniens*, is a large-bodied Sciaenid that is native to the Mississippi River. On average, Freshwater Drum live 6-8 years. Here we report the occurrence of a Freshwater Drum we aged at 43 years old. This fish was collected by the field personnel at the Iowa DNR's Bellevue office. Long-lived species present unique management challenges. With long-lived populations, any source of additional mortality can crash populations. Freshwater Drum is a common fish across the Mississippi River basin. The occurrence of this old individual sheds light on the longevity of certain Mississippi River fishes. Subsequent care should be placed in managing any long-lived fish population, regardless of status (i.e., rare vs abundant fishes).

**Funding:** Federal (U.S. Army Corps of Engineers' Upper Mississippi River Restoration Program, Long Term Resource Monitoring (LTRM))

**Program/mechanism supporting research/creative efforts:**  
WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #12**

Use of Conspecific Stimuli to Increase Loggerhead Shrike detection

**Brandelle Jett,\* Christopher Lituma, and Laura Graham**

*Davis College, Division of Forestry and Natural Resources, West Virginia University, Morgantown, WV  
26505*

**Field (Broad Category):** Other (Sciences)

**Student's Major:** Animal and Nutritional Sciences

The Loggerhead shrike is a unique songbird to say the least. This songbird has evolved and developed raptor-like mannerisms when it comes to its prey, even going so far as to impale its prey on barbed wire. However, another unique aspect of this bird is that they are illusive and do not sing often. We are using recording boxes set up in areas in southern West Virginia and southern Virginia to try and find out when these birds are most vocal throughout the day and the year, and we are trying different methods such as using decoys to see if we can provoke the birds to sing more often. The recordings that are taken are then combed through for the adult or young birds. This data will be used to better understand why these birds are not as vocal as other songbirds, when these birds tend to be most vocal and active during the day and help get a better idea about the population numbers of the species.

**Funding:** Private

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

## Session IV (1:50-3:30 pm) – Behavioral & Social Sciences

### Poster #14

Readability and Research Impact

**Natalie Rogers,\* and Bryan McCannon**

*John Chambers College of Business and Economics, Department of Economics, West Virginia University,  
Morgantown, WV, 26506*

**Field (Broad Category):** Other (Social Sciences)

**Student's Major:** Economics

**Readability and Research Impact** Natalie Rogers and Dr. Bryan McCannon The purpose of this study was to locate a correlation between the objective readability of journal articles and their influence within the community of economics. Economists are known for being poor writers, and researchers were trying to see if it truly mattered whether or not an author was a poor writer, or if the content itself was enough to create a sphere of influence. The main criteria used to judge exposure and influence was the number of citations a journal article in the American Economic Review received. To do this, 10 years' worth of various parts of American Economic Review journal articles were entered into a readability software, which returned eight numbers, which were the articles' scores on eight different objective readability scales. Once these numbers were computed, the researchers created a spreadsheet and used various statistical softwares to determine if writing ability truly had any correlation with the exposure and influence a journal article presented. Other factors were considered as well, such as the place of employment of the author, and whether or not the author has received a Nobel Prize in economics. After preparing several graphs and other data analysis methods, it was discovered that there is somewhat little correlation between the two, except for in the top quintile. Those who had the highest amount of citations tended to have the highest measures of objective readability, as well.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Poster #15**

Effect of Manner of Articulation on Different Types of Variance During Speech Motor Learning

**Cahn, J.\* and Meigh, K.**

*Department of Communication Sciences and Disorders, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Physical/Occupational Therapy, Speech Language Pathology & Audiology  
(Social Sciences)

**Student's Major:** Speech Pathology and Audiology

**Introduction:** This study analyzed two categories of kinematic variance, good variance and bad variance, during a speech motor learning task. Good variance is described as variance that may either help or not negatively affect performance, and bad variance is described as variance that may negatively affect performance (Latash, 2012). The goal of this study was to evaluate whether two different manners of articulation (i.e., air flow patterns in the vocal tract) had differences in good and bad variance patterns during a nonword repetition task. It was hypothesized that stop phonemes (i.e., sounds where airflow is blocked) would minimize bad variance more quickly than fricative phonemes (i.e., sounds where airflow is constricted). **Methods:** Participants repeated four types of nonwords containing four and six syllables, and with stops ("t" sounds) and fricatives ("s" sounds) for 12 training blocks, where each block contained three repetitions of each nonword. Participants' articulatory movements were tracked using the WAVE Speech Research System and sensors were attached to the tongue tip and blade, lips, and jaw. **Results:** Differences between stops and fricatives accuracy and acoustic durations are currently being analyzed for each training block. **Discussion:** The results of this study will update our understanding of variance and speech motor learning. Historically, variance has been considered detrimental to speech performance; however, the results of this study may suggest differences in variance (e.g., good versus bad) may exist for different speech sounds. These differences may then be further explored to provide positive impacts on clinical practices in speech-language pathology.

**Funding:** Institutional (West Virginia University)

**Program/mechanism supporting research/creative efforts:**  
WVU's SURE program

**Poster #16**

Quality over Quantity: Positive Relationship with Older Adults is Associated with Less Ageism

**Hannah N. Amick,\* Jerin Lee, M.S., and Natalie J. Shook**

*Department of Psychology, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Psychology (Social Sciences)

**Student's Major:** Psychology

With the US population aging, some scholars have proposed that ageism, or negative attitudes toward older adults, is a "serious national problem." Relatively little research has examined ageism and means of reducing negative attitudes toward older adults. A few studies have found that greater contact with older adults is associated with less ageist attitudes, but quality of contact may play a more significant role than quantity in contributing to more positive attitudes toward older individuals. In the current study, we examined the extent to which contact with older adults and the quality of that contact individually and interactively contributed to ageism, assessed through multiple existing measures of ageism. The study was an exploratory correlational study consisting of 473 undergraduate students (358 women) who filled out a survey that assessed their attitudes, emotions, and societal impressions. The results showed that higher quality contact, and not the amount of contact, with older adults was significantly associated with less ageism across three measures. In addition, our findings indicated that there was not a significant interaction effect between quantity of contact with older adults and the quality of that contact. The good news for older adults is that positive relationships pursued with them can lead to less ageist ideas. It is important to further explore research on this topic since it is not currently very well researched and affects the older adult population significantly.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #17**

Personality Traits as Predictors of Alcohol Consumption During the First Year of College

**Kelsey L. Barton,\* Sarah E. Whiteman, and Nicholas A. Turiano**

*Eberly College of Arts and Sciences Department of Psychology, West Virginia University, Morgantown, WV, 26506*

**Field (Broad Category):** Psychology (Social Sciences)

**Student's Major:** Psychology

A significant event in every incoming freshman's life is the transition to college, which poses many emotional, physical, and social changes that will occur in such a small amount of time. The current study examined how the Big 5 personality traits predicted change in average alcohol use and binge drinking during the first year of college in a cohort of 580 first time freshman attending West Virginia University. The analyses of the current study indicated that college students who had higher Neuroticism, higher Extraversion, higher Openness to experience, and lower Conscientiousness were associated with higher alcohol consumption and frequency of consumption. The results indicated that those scoring lower in conscientiousness started drinking at much higher rates than those with high conscientiousness, and they consumed more alcohol over time. The results also indicated that those who scored lower in conscientiousness engaged in binge drinking more often than those who scored higher in conscientiousness. Some limitations of this study include attrition and convenience sampling. These results can help researchers develop effective intervention programs for college drinking.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course  
McNair Scholars Program

**Poster #18**

Racial Prejudice on College Campuses: the Role of Social Integration and Intergroup Contact

**Eva M. MacFarland,\* and Natalie J. Shook**

*Department of Psychology, West Virginia University, Morgantown, WV, 26506*

**Field (Broad Category):** Psychology (Social Sciences)

**Student's Major:** Psychology & Biology

Despite important strides in the past few decades, racial prejudice continues to be an ongoing problem in the U.S. Previous research has shown that White college students randomly assigned to an interracial roommate relationship exhibit more prejudice reduction compared to those assigned to a same race relationship (Shook & Fazio, 2008). However, this effect may be moderated by features of the relationship. The present study tested if social integration (i.e., how many mutual friends roommates share) moderated the effect of interracial roommate contact on prejudice. White college freshmen (N=216) randomly assigned to same race or different race roommates completed an indirect measure of prejudice toward African Americans, Hispanics/Latinos, and Asians. Roommate integration into one's social network significantly moderated the effect of room type on prejudice toward African Americans, Hispanics/Latinos, and Asians. Overall, in interracial rooms, those with greater social integration showed more reduced prejudice than those with less social integration. Alternatively, in same race rooms, participants with greater social integration showed higher prejudice. These findings further elucidate the inverse relation between intergroup contact and prejudice by explaining the combined role of contact and social integration.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's SURE program

**Poster #19**

Strange Situation Procedure Vs. Attachment Q-Sort Measures in Determining Attachment Security in Toddlerhood

**Nila Manivannan,\* Corey Lieneman, and Cheryl McNeil**

*Department of Psychology, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Psychology (Social Sciences)

**Student's Major:** Biochemistry, Psychology

During children's early years, they form at least one close attachment relationship to develop properly. They view their attachment figure as a secure base to explore their surroundings from (Ainsworth, 1969). Two prominent procedures that measure attachment security in infants and toddlers are the Strange Situation Procedure (SSP) and Attachment Q-Sort (AQS). The SSP consists of categorizing the behavior of the child following the removal and return of parent availability. The AQS involves sorting cards describing the child's varying attachment behaviors during observation, resulting in an overall security score. The SSP was created before the AQS and is considered the gold-standard measure of infant attachment; however, the AQS can be used for a broader range of ages (12-48 months), repeated more often, used in a wider variety of populations, and conducted less intrusively than the SSP. Researchers have used the SSP to assess attachment from infancy into the toddler years during treatments focused on improving attachment. However, the SSP has not been validated for the assessment of attachment in the toddler age range. Therefore, the critical question is whether the SSP is reliable and valid for assessing attachment in older children. To address this, the current project used a comprehensive literature review to analyze the relationship between the SSP and AQS. Correlations and effect sizes will be pulled from existing studies to examine what is known in the literature about how the reliability and validity of the AQS relates to that of the SSP in the toddler age range.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**  
capstone course within my department

**Poster #20**

Adolescents' Pursuit of Well-Being in relation to Substance Abuse and Life Satisfaction

**Liam McCabe\* and Amy Gentzler**

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**Field (Broad Category):** Psychology (Social Sciences)

**Student's Major:** Psychology

Hedonia is when an individual seeks happiness through positive feelings such as joy and pleasure whereas eudaimonia is seeking happiness through self-actualization (Huta & Ryan, 2010). It was hypothesized that adolescents who report more hedonic motives would be more likely to use illicit substances. On the other hand, students who report more eudaimonic motives were expected to have higher life satisfaction. This study involved giving a survey to ninth grade students using items derived from the Hedonic and Eudaimonic Motives for Activities survey (Huta & Ryan, 2010), Student Life Satisfaction Scale (Seligman, Huebner, & Valois, 2003), and the Alcohol, Smoking, and Substance Involvement Screening Test (World Health Organization, 2002). Using correlational analyses, it was found that hedonic motives and substance use were not significantly related. However, as hypothesized eudaimonic motives were positively correlated with life satisfaction. Overall, adolescents who reported hedonic motives for activities were not associated with increased substance use while adolescents that reported more eudaimonic motives for activities had more satisfaction in life. This research suggests it may be important to help adolescents develop more eudaimonic motives for activities in their daily lives to enhance well-being. Keywords: happiness, life satisfaction, substance use, hedonia, eudaimonia, well-being

**Funding:** Federal (West Virginia University)

**Program/mechanism supporting research/creative efforts:**  
a WVU 497-level course

**Poster #21**

Teen Life Project: Social Media Use and Happiness among High School Students

**Emma Mendoza\* and Amy Gentzler**

*Psychology Department, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Psychology (Social Sciences)

**Student's Major:** Psychology

This presentation examines adolescents' social media use and how it relates to their happiness levels. For the overall study, we recruited 9th graders by going into high schools (in West Virginia, Pennsylvania, and Maryland). Any ninth grader who participated had to have at least one parent complete the study with them and both completed consent forms. The study was done either in their school, in our lab, in their home, or another public location. Adolescents completed questionnaires regarding addiction to social media use (Andreassen et al., 2012), their negative reactions to social media use (e.g., feeling upset or left out; Gentzler, 2017), and their overall happiness (Lyubomirsky & Lepper, 1999). These items were entered into SPSS, then scores were computed. The correlation between these measures were examined. The results indicated that the more negatively they felt towards social media the less happy they felt. However, social media addiction levels were not related to happiness. The study show that social media may have negative effects on some adolescents' happiness.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #22**

Understanding the Association between Political Identity and Immigration Attitudes

**Julia Scheuttig\* and Natalie J. Shook***Eberly College of Arts and Sciences, Department of Psychology, West Virginia University, Morgantown, WV 26505***Field (Broad Category):** Psychology (Social Sciences)**Student's Major:** Psychology

The current political landscape in the US is characterized by polarization and conflict. A primary topic of divide and partisanship is immigration, particularly with the President's proposal to build a wall to keep immigrants out of the United States. Although there is a considerable amount of empirical and anecdotal evidence linking political identity with immigration attitudes (i.e., conservatives generally have more negative attitudes toward immigration, and liberals have more positive attitudes toward immigration), relatively little research has examined what factors may underlie this association. The goal of the present study was to determine the extent to which patriotism, nationalism, and internationalism may account for the link between political identity and immigration attitudes. Participants (N = 616) completed an online survey. As expected, political identity was significantly correlated with attitudes toward immigration with conservatives reporting more negative attitudes. Political conservatism was also significantly correlated with greater endorsement of nationalism and patriotism, as well as less endorsement of internationalism. Furthermore, the link between political ideology and immigration attitudes was partially accounted for by nationalism and internationalism. That is, political conservatives endorsed greater nationalism and less internationalism, which in part explained the more negative attitudes toward immigration. This study has implications that one's political identity may not be the determinant in their attitudes toward specific political issues as it is often assumed.

**Funding:** Not funded**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) &amp; accompanying HONR 297-level course



**Poster #23**

Personality Traits Predict Change in Depression and Stress Levels During the Transition to College

**Sarah E. Whiteman,\* Kelsey L. Barton,\* and Nicholas A. Turiano**

*Eberly College of Arts and Sciences Department of Psychology, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Psychology (Social Sciences)

**Student's Major:** Psychology

The transition to college is a key development period for students. Lifestyle changes, increases in demands and responsibilities can have an impact on mental health. The purpose of the current study was to examine whether personality traits could predict changes in depression and stress levels during the transition to college. We used a sample of 580 first-year freshman, and they were assessed five times over the course of their first year of college. The Big Five Inventory was used to assess personality (neuroticism, conscientiousness, extraversion, openness, and agreeableness). The CES-D was used to measure depression levels, and the Perceived Stress Scale was used to measure stress. We estimated a series of latent growth curve models to assess whether depression and stress levels changed over time and if there was variability in that change. Results suggested that higher conscientiousness was associated with lower initial depression levels and smaller increases over time. It also was associated with very steep decreases in stress over time. Higher openness was associated with steeper increases in stress over time, but levels normalized by the end of the year. Overall, personality assessment prior to college is useful to identifying those who are most at risk of poor mental health trajectories when transitioning into college.

**Funding:** Federal (National Institute of General Medical Sciences)

**Program/mechanism supporting research/creative efforts:**

My efforts were mainly voluntary.

**Poster #24**

The Relationship Between Stigma and Opioid Use Disorder

**Kelly O'Brien\* and Julia Fraustino**

*Julia Daisy Fraustino Reed College of Media, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Social Work & Human Services (Social Sciences)

**Student's Major:** Strategic Communication

The use of opioids is an increasing problem in the United States. According to Council of Foreign Relations, opioid overdose claimed the lives of more than 47,000 people in 2017 (Felter, 2019). A contributing factor for the rise of this epidemic is the stigma associated with opioid use disorder (OUD). Stigma is a negative attitude society holds towards a particular attribute. This attitude results in the degrading of this attribute causing shame and isolation in society (Fraustino, 2018; Stigma Free WV, 2019). Stigma can influence OUD by causing people with OUD to feel devalued based on the anticipation of society's negative judgments and reactions. People who feel devalued in this context are less likely to receive help and more likely to relapse when they do receive help; this also includes stereotypes about medical patients and medicine-based opioid treatment in society and public institutions (Livingston, Milne, Fang & Amari, 2012). Stigma can be categorized into three types: self, public and structural stigma (Stigma Free WV, 2019). Self-stigma is the process whereby stigmatized individuals believe that most individuals believe in the common stereotypes of their stigmatized category, which can lead to a decline in self-esteem and self-worth. Public stigma is the endorsement of discrimination toward a specific group. Structural stigma is the stigma at a larger level, when policies and procedures of institutions (including, for example in this context, doctors and medical institutions) represent negative attitudes and restrict the rights of stigmatized groups (Livingston, Milne, Fang & Amari, 2012; Kulesza, Larimer & Rao, 2013).

Thus, the purpose of this work is to focus on how stigma affects OUD, and how stigma literature can inform strategic communication to reduce stigma. By synthesizing stigma literature, we can make strategic recommendations for stigma-reduction campaign planning based on interdisciplinary literature's theoretical and practical implications. That is, this literature review project will allow for applying past research as a guide for using strategic communication to combat the opioid epidemic in West Virginia.

**Funding:** Not funded (N/A)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

N/A

**Poster #25**

The Study of Social, Behavioral, and Health Problems in Different Generations

**Lindsey Smith\***

*Allen Hall Department of early Childhood Development West Virginia University, Morgantown WV 26505*

**Field (Broad Category):** Social Work & Human Services (Social Sciences)

**Student's Major:** Art education

The regular interval of social, behavioral, and health problems in subsequent generations of families is a common theme in both scientific and popular literature. This review discusses recent theoretical models and findings from long term studies concerning the transfer of psychosocial risk, including generational progression, and the processes where a generation of parents may place their offspring at elevated risk for social, behavioral, and health problems. Some findings include the effects of parenting and environmental factors in the transfer of risk. In both girls and boys, childhood aggression and antisocial behavior appear to predict long-term paths that place offspring at risk. consequences of childhood aggression that may threaten the well-being of offspring include school failure, adolescent risk-taking behavior, early and single parenthood, and family poverty. These childhood and adolescent behavioral styles also predict harsh, aggressive, neglectful, and unstimulating parenting behavior toward further generations. Factors within at-risk families include maternal educational fulfillment and constructive parenting practices such as emotional warmth, consistent disciplinary practices, and cognitive setting. These findings to highlight the potential application and relevance of studies for social, educational, and health policy.

**Funding:** Federal

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course  
Amy Root

**Poster #26**

Differences in Online Professional Development Among Graduate Students

**Riley Darragh,\* Ellory Dabbs, and Christopher P. Scheitle**

*Department of Sociology and Anthropology, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Sociology (Social Sciences)

**Student's Major:** Criminology and psychology

It has become common for individuals to cultivate a professional presence online using social networks, personal websites, and other online tools. This is true among academics as well. But what drives the formation of such an identity? Why are some academics more inclined than others to create an online professional image? Previous studies on this topic have primarily focused on established academics and undergraduate students, or have only examined a limited number of online sites. The current study aimed to examine this phenomenon holistically and specifically with the graduate student population. The professional online presence of 1,000 graduate students from various programs, disciplines, and backgrounds is analyzed by their possession of a variety of professional profiles including a department profile with their program, profile with their group lab, personal website, and profiles with ResearchGate, Academia.edu, LinkedIn, Google Scholar, and Twitter. Our results indicated relationships between online professional networking and three main variables: discipline, program ranking, and sex. These findings highlight clear discrepancies between students that may play a role in making some more marketable than others and can be used to examine inequalities in the education system that factor into employment after graduation.

**Funding:** Federal (National Science Foundation)

**Program/mechanism supporting research/creative efforts:**

My efforts were mainly voluntary.

**Poster #27**

Various Attitudes Towards The Orlando Apollos

**Emmy Rinehart,\* Kayla McNair, and Chelsea Harper**

*WVU Reed College of Media, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Business (Sport Science/Psychology)

**Student's Major:** Strategic Communications

Our research topics are how the Apollo's success affects sentiment on Twitter, if the likelihood of Floridians watching Florida NFL teams play correlates with the likelihood that they will watch the Orlando Apollos, and how people in a Morgantown sports bar will react if an Apollo's game is being shown on one of the televisions. With increasing tensions surrounding the NFL, people may be looking for a new league to support. Additionally, Florida's NFL teams have not performed well, so fans may want a new team to support. We will do a Network Analysis using hashtags from a game to determine sentiments when the Apollos are winning or losing. To determine the likelihood that someone will watch them play based on their likelihood to watch NFL teams in Florida, we will use a survey targeted at sports related majors from Florida on campus. Finally, we will use observational research to determine how many times people view televisions the Apollos are playing on in a Morgantown sports bar in one hour and how they react. We predict sentiments will be negative when the Apollos are losing and vice versa, that likelihood of watching Florida NFL teams play will be positively correlated with likelihood that they will watch the Apollos, and that people in a sports bar in Morgantown will not watch the Apollos play as often as other teams that are being shown in the establishment, but they will react positively if they do.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

Other

STCM 421 Sec 002

**Poster #28**

New San Antonio Sports Team Challenges Fan Loyalty in Texas

**Lindsey Dillon,\* Halle Guzolik,\* and Jennifer Harker**

*Martin Hall, Reed College of Media, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Communications/Journalism (Sport Science/Psychology)

**Student's Major:** Advertising

This research focuses on the San Antonio Commanders, a pro football team in the Alliance of American Football (AAF), to explore how popular this new team will be amongst other Texas-based professional teams. For example: How will the support for the San Antonio Commanders compare to the support for the San Antonio Spurs? Since this is the first pro football team in San Antonio, and Texas is saturated with sports teams, we will investigate whether the Commanders can establish a strong fan base in San Antonio. We first analyzed the secondary research on Texas-based professional teams and then we take a multi-method approach by using primary research including an observation, a survey of sport consumers, and a network analysis of hashtag use on Twitter regarding the team. Preliminary analyses show that team sentiment declines in news articles and social media following a loss, our research explores the ways in which the team can counter this negative sentiment. Furthermore, if the data supports our hypothesis then the Commanders can use the findings to advance their overall ratings for the team.

**Funding:** Not funded (WVU)

**Program/mechanism supporting research/creative efforts:**

Other

**Poster #29**

Football Being Reinvented- How Many People Willing to Watch?

**Jocelin Leon,\* Justin Erkoboni, and Megan McCluskey**

*Reed college of media*

**Field (Broad Category):** Other (Sport Science/Psychology)

**Student's Major:** strategic communications

The Xtreme Football League (XFL) is an American Football League looking to reimagine football. They are seeking to make America's favorite sport available to watch off-season and change the traditional rules of the game. Providing a faster and more exciting experience for football fans. Because it's important to know your audience when launching a new football league to gain a strong following, we will be researching how likely fans are to support XFL Tampa Bay. Secondary research so far suggests that the XFL will have trouble competing with the NFL, so they will need to strategize a different approach to gain a fan base. By estimating the number of people who will show interest in watching XFL games and segmenting their audience they will have a better chance at successful marketing. In-depth interviews will be conducted to gain an understanding of sentimental values connected between fans and their teams, why the XFL would be worth watching, and what their connections are between existing Florida football teams. Currently no primary research has been conducted yet, however we are expecting that avid football lovers will watch because they wish to watch football all year long, not just seasonally. We are also predicting World Wrestling Entertainment (WWE) viewers will support the XFL because of their association with the same executive and the game provides the same intensity as wrestling. Knowing a team's audience will serve a purpose in growing a loyal following and bring further attention to other XFL teams.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

Other

STCM 421

**Poster #30**

Effects of Treatment Integrity Commission Errors on Noncontingent Reinforcement

**Sydney Hull,\* Stephanie Jones, and Claire St. Peter**

*Psychology Department, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Psychology (Sport Science/Psychology)

**Student's Major:** Psychology

Behavioral interventions are important for children who have challenging behavior. It will not only help classroom activity but also improve at home behavior. Noncontingent reinforcement (NCR) is a treatment strategy that is used in behavioral analysis. This is when problem behavior such as protesting statements, no longer results in the reinforcer, such as a tangible item. Therefore, the therapist will provide a reinforcer at specific set intervals, such as every 9 seconds, regardless if the participant responds or not. Because the therapists are providing a reinforcer at specific times, there can be mistakes or errors that occur. This study will examine the effects of these errors on NCR treatment. The study will use four elementary aged children who have challenging behavior, to participant in the study. The researchers hypothesized that NCR will decrease problem behavior but with errors in the treatment sessions, this may actually increase problem behavior. These errors will include things such as, giving the tangible item back to participant when he or she was not supposed to receive the item.

**Funding:** Institutional (Psychology Department Graduate Student Research Fund)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Poster #31**

A Pilot Test of a Collaborative Online International Learning Framework in Kinesiology Classrooms

**Emma Harris,\* and Dana K. Voelker**

*College of Physical Activity and Sport Sciences, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Sports Management/Sport Exercise Psychology (Sport Science/Psychology)

**Student's Major:** Sport and Exercise Psychology

Collaborative Online International Learning (COIL) is a technology-driven, pedagogical approach for advancing the internalization of teaching and learning in higher education (American Council on Education, 2016). Based on the concept of virtual mobility, COIL courses incorporate: (1) collaborative opportunities for students and teachers at multiple institutions, (2) use of online technology to enhance connectivity, (3) inclusion of international dimensions, and (4) integration in already established learning processes (SUNY, 2019). During the fall 2018 semester, faculty in the WVU College of Physical Activity and Sport Sciences (CPASS) developed, implemented, and evaluated three COIL courses to further integrate global engagement across the curriculum. Specifically, three CPASS instructors redesigned their existing kinesiology courses to integrate collaborative interactions with faculty and students in Brazil, Japan, and Sweden, respectively. The purpose of the present study was to qualitatively examine students' perceptions of how their engagement in a COIL course impacted their learning and worldviews. A total of 62 undergraduate and graduate students who participated in a COIL course responded to a series of open-ended prompts via a Qualtrics online survey both before and after the course. A four-person investigative team analyzed the data using thematic analyses (Braun, Clarke, & Weate, 2016). Students reported the COIL course experience positively impacted their learning by expanding their knowledge of course content and culture. Students reported changing worldviews and gaining diverse perspectives. Our results preliminarily suggest COIL courses are an effective way to provide global experiences for students at home while positively impacting their learning and appreciation for diverse cultures.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

## Session IV (1:50-3:30 pm) – Biological & Biochemical Sciences

### **Poster #32**

NMNAT1, a Protein Associated with Blinding Disease, is Crucial for Retinal Development and Stability

**David Sokolov,\* Emily Sechrest, Joseph Murphy, Yekai Wang, Jianhai Du, Peter Mathers and Saravanan Kolandaivelu**

*Department of Ophthalmology, West Virginia University Eye Institute, Morgantown, WV 26505*

**Field (Broad Category):** Biochemistry (Sciences)

**Student's Major:** Biology, Mathematics

Vision is a remarkable, multifaceted biological process, and diseases associated with the visual system affect a considerable portion of our population. Among these diseases is Leber's congenital amaurosis (LCA), a devastating, early-onset blinding disease which is the leading cause of inherited blindness in children. To date, mutations in 22 genes have been associated with LCA. One of these genes encodes 'nicotinamide mononucleotide adenylyltransferase 1' (NMNAT1), a ubiquitous enzyme whose specific function in the eye is not well understood. Notably, mice in which NMNAT1 is mutated go blind but do not present with any other detectable symptoms, hinting at an especially crucial function of NMNAT1 in the retina of the eye. In order to better understand the role of NMNAT1 in retinal development and maintenance, we created a 'knockout' mouse model lacking NMNAT1 in the retina. Our results indicate that retinal-specific NMNAT1 loss leads to a severe phenotype in mice as early as 10 days of age, with rapid retinal degeneration and loss of visual function by one month of age. Interestingly, loss of NMNAT1 affects both the late-stage development of photoreceptor cells as well as the continued stability of the entire retina. In addition, retina lacking NMNAT1 show changes in several key cellular molecules, including Thiamine (vitamin B1) and Glucose 6-phosphate (G6P). Overall, our findings indicate that NMNAT1 plays a crucial role in the mammalian retina and in retinal metabolism, and serve as a foundation for follow-up studies concerning the role of NMNAT1 in blinding disease.

### **Funding:**

**Program/mechanism supporting research/creative efforts:**

Biology 486 capstone

**Poster #33**

Yeast Atlas, phenotypic diversity of wild yeast from North and South American regions

**Jordan Barney,\* Matthew Winans and Jennifer Gallagher**

*Eberly College of Arts and Sciences, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Biology (Sciences)

**Student's Major:** Biology

The ecology of wild strains of *Saccharomyces cerevisiae* from around the globe is poorly understood. Early domestication by human kind and ubiquitous use of a select few strains has led to an ambiguous origin. Glyphosate is an herbicide which is commercially used as the main ingredient in Roundup®. Prolonged use has increased glyphosate resistant plants, which may affect human health. In this study, urban and rural isolates were obtained through phenol-chloroform extraction of genomic DNA and amplification of their internal transcribed spacer (ITS) gene of the ribosomal DNA. Sanger sequencing was employed and used in conjunction with NCBI databases for identification of yeast genus. Development of The Yeast Atlas as resource to better understand mechanisms of response, adaptation, and evolution to stimulants such as chemicals including glyphosate is a tool for yeast researchers to harness the genetic diversity of wild strains with ease. This effort is currently on going; genetically diverse wild yeast are being both processed and identified. Once identified, the collected *S. cerevisiae* samples will be categorized by location and evaluated for phenotypic responses to chemicals. Greater than 623 samples have been amassed and 538 isolates recorded. PCR amplification of 421 amplicons aided in 329 species being matched in the NCBI database. Phylogenetic diversity of the isolates varies to include *Pichia*, *Lanchancea*, *Candida*, and more families of yeast other than *Saccharomyces*. North and South American isolates of *S. cerevisiae* will be assayed against chemical stressors, including glyphosate, as a screening process for phenotypic traits of wild yeast.

**Funding:** Federal (National Science Foundation)

**Program/mechanism supporting research/creative efforts:**

Other

WVU 386-level course

**Poster #34**

A Hypermorphic Allele Encoding The Ragulator Ortholog Overstimulates Torc1

**Steven Carlson,\* Amaury Pupo Merino, and Jennifer E.G. Gallagher**  
*Department of Biology, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Biology (Sciences)

**Student's Major:** Biology

Nutrient availability and sensing are fundamental to cellular growth and division. In the absence of nutrients, genetic variation in regulatory pathways can bypass the regulation of growth through hyper-stimulation of intracellular growth pathways. The Target of Rapamycin Complex 1 (TORC1) is activated in response to cellular nitrogen sources and induces proliferation through kinase cascades that induce ribosome biogenesis, protein synthesis, and inhibition of autophagy. High cytosolic amino acid concentrations stimulate and yet limit TORC1 activity through several vacuolar-localized signaling cascades. Unregulated cell growth is a hallmark of cancer and overlapping pathways mitigate negative effects of excess cell growth. The TORC1 Ragulator complex (EGO complex) is required for growth recovery after either TORC1 inhibition via rapamycin treatment or amino acid starvation. There is genetic variation in EGO complex proteins in different individuals of the same species. In order to investigate the integration of amino acid availability signals into growth cues, we analyzed TORC1 activity in the absence of aromatic amino acid synthesis with two different, but naturally occurring variants of Ego3 in the model organism, *Saccharomyces cerevisiae*. Phosphorylation of Sch9, the yeast ortholog of mammalian S6 kinase and a target of active TORC1, was different in genetically identical yeast but contained different alleles of Ego3. In slow recovery strains, lacking the aromatic amino acid biosynthesis enzyme (Aro1), we show that Ego3 allelic variation differentially rescued growth recovery via TORC1 signaling. Given the implications of mammalian TORC1 dysregulation in tumorigenesis, further understanding in its upstream activators leads to more possibilities for cancer treatment.

**Funding:** Federal (National Institutes of Health)

**Program/mechanism supporting research/creative efforts:**

Other

WVU 386

**Poster #35**

Characterizing the onset and extent of aberrant swimming behavior in *gsx1* mutant zebrafish

**Oliver Cook,\* Alexandra Rose Schmidt, and Sadie A. Bergeron**  
*Department of Biology, West Virginia University, Morgantown, WV, USA*

**Field (Broad Category):** Biology (Sciences)

**Student's Major:** Biology

Genomic Screen Homeobox 1 (*Gsx1*) is a transcription factor that functions in the formation of brain regions like the olfactory bulb and hypothalamus by regulating expression of numerous target genes during neurodevelopment in mouse and zebrafish. Loss of *Gsx1*-expressing neurons in zebrafish affects sensory processing, but a knowledge gap exists regarding how *Gsx1* promotes development of sensory neural circuits and how this translates into behavior. Before investigating specific deficits at the neuroanatomical level, it is important to establish a framework of behavior for wild type and *gsx1* mutant zebrafish. We performed an analysis of *gsx1* mutant swimming behavior from fry to adult age, with and without food stimulus. Fish tanks were separated into three regions with equivalent boundaries, and swimming patterns were recorded and analyzed to determine the average percentage of time fish spent per zone and in shoals. *gsx1* mutant zebrafish oriented less in shoals compared to wild types and were more likely to feed in the top and bottom zones. Wild types demonstrated a shift at 4-weeks of age with increased time spent in the top and middle zones for feeding. Upon repeating the experiment, the mutants failed to bottom-zone feed for significant periods of time, while the wild types again demonstrated increased feeding time in the top zone by 4-weeks of age. These results indicate there are social deficits within mutants such as reduced shoaling, and they establish a baseline behavior timeline for wild types that can be utilized in further assays of group associative learning dynamics.

**Funding:** Institutional (WVU Biology Department)

**Program/mechanism supporting research/creative efforts:**

My efforts were mainly voluntary.

I started my research as a BIOL 386 class but continued it as a volunteer in subsequent semesters.

**Poster #36**Hybridization in *Rhus ovata* and *R. integrifolia* (Anacardiaceae) Using Molecules and Morphology**Josh Lambert,\* Brandon Sinn, and Craig Barrett**

Department of Biology, West Virginia University, Morgantown, WV 26505

**Field (Broad Category):** Biology (Sciences)**Student's Major:** Biology

*Rhus integrifolia* and *R. ovata* are shrubs native to southern California, Baja Peninsula, and Arizona (*R. ovata* only), comprising major structural components of coastal sage scrub and chaparral communities. Both are hypothesized to hybridize, often displaying intermediate features. The goals of this study are to answer how: 1) natural selection and gene flow interact to determine species boundaries; 2) genetic variation is distributed over the geographic range of this species complex; and 3) (ultimately) ecological niches influence morpho-genetic distinctness and hybridization. PCR reactions have been performed for 131 individuals of *R. integrifolia*, *R. ovata* and their hybrids for two plastid spacer regions and the nuclear Internal Transcribed Spacer (ITS). In addition, we have quantified 12 leaf shape features for the same individuals, including multiple leaf samples from some. Putative hybrids are interspersed among western *R. ovata* and *integrifolia* plastid haplotypes, where their ranges overlap, but no eastern haplotypes are found among pure populations of *R. integrifolia* in coastal CA, nor western types among isolated populations of *R. ovata* in AZ, thus representing the two most distinct extremes. We expect to find intermediate ITS-types among populations showing morphological evidence of hybridization. *Rhus ovata*, *R. integrifolia* and their putative hybrids had significantly different leaf morphologies, which did not differ across localities, but had a significant species-locality interaction. Ultimately, we aim to combine genetic, morphological, and environmental information in a single framework to test hypotheses on how environmental selection pressures maintain species boundaries in the face of recurrent hybridization.

**Funding:** Not funded**Program/mechanism supporting research/creative efforts:**

Other

Biology 386 course

**Poster #37**

Reciprocal Regulation of Doublesex and Hedgehog Pathway in *O. Taurus* Horn Development

**Madeline Piper\* and Teiya Kijimoto**

*Division of Plant and Soil Sciences, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Biology (Sciences)

**Student's Major:** Biology

Understanding how genes form new regulatory relationships is key to determining the genetic underpinnings of the development of novel traits. Our lab utilizes the dung beetle species *Onthophagus taurus* to address this biological question. *O. taurus* males develop a pair of horns, and our previous studies have shown two distinct developmental processes are involved; sex determination regulated by the gene doublesex (*dsx*) and anterior-posterior axis patterning regulated by Hedgehog pathway. Our specific aim for this study is to detect expression of Hedgehog pathway in the developing beetle. We collected animals in the late larval stage (called prepupa) during which horns rapidly develop, determine their sex and weight, then fix them for immunostaining. We employed immunohistochemistry to detect the protein *Cubitus interruptus* (Ci), which is a part of the hedgehog pathway. Our preliminary results show that Ci protein is present in the developing horn tissues of the head, as well as in other tissues, such as the legs. This is the first visualized evidence of the expression of Hedgehog pathway in horn tissue. The importance of this research can be found in that the hedgehog pathway is highly conserved across organisms, and the results of this study could have implications for understanding paracrine signaling pathways and how novel traits are developed.

**Funding:** Federal (USDA, NIFA (WVA00712))

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #38**

Studying Development of the Hypothalamus in genomic screen homeobox 1 Mutant Zebrafish

**R. Madison Riffe,\* Samantha L. Phelix,\* Sarah N. Peterson,\* Rebecca A. Coltogirone, and Sadie A. Bergeron**

*WVU Biology Department, West Virginia University*

**Field (Broad Category):** Biology (Sciences)

**Student's Major:** Biology

Neurodevelopment in part requires the combinatorial expression of transcription factors that regulate gene expression for the correct type and number of neurons to form. The homeobox gene genomic screen homeobox 1 (*gsx1*) encodes a transcription factor with roles in the hypothalamus, including regulating body growth and the visuomotor response in zebrafish. We hypothesize that *gsx1* regulates the type and number of developing neurons in the hypothalamus through transcriptional control of tyrosine hydroxylase 1 (*th1*), vesicular glutamate transporter 2a (*vglut2a*), and retinal homeobox 3 (*rx3*). We used in situ hybridization and immunohistochemistry to visualize markers for expression of these genes. Our in situ hybridization studies show a significant decrease in *th1* expressing neurons in the hypothalamus of *gsx1* mutant and heterozygous zebrafish compared to their wild type (*wt*) siblings at 30 hours post fertilization (*hpf*), but no significant difference at 72*hpf*. Our immunohistochemistry studies revealed no significant change in GFP expression in the *Tg(rx3:GFP)* transgenic line between mutant and *wt* zebrafish at 96*hpf*. Preliminary views of *tagRFP* expression in the transgenic line *Tg(vglut2a:tagRFP)* indicated that *vglut2a* is unchanged in the hypothalamus of mutant zebrafish at 96 *hpf* compared to their *wt* siblings, but subtle variations exist that further analysis will confirm. Thus, *gsx1* does not seem to play a role in development of the correct number of neurons in the hypothalamus. Additional work will confirm whether it regulates the development of specific neuron types, and potentially reveal novel information about the genetic basis of proper hypothalamus development.

**Funding:** Institutional (WVU Biology Department (and WVU Summer Undergraduate Research Experience and Supplemental Fund))

**Program/mechanism supporting research/creative efforts:**

Biology 486 capstone

WVU SURE, WVU Honors Excell Enrichment Fund



**Poster #39**

Analysis of a mutation in protein kinase CK2 underlying 'Okur-Chung's Neuropathy'

**Garrett P. Riggleman\* and Ashok P. Bidwai**

*Department of Biology, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Biology (Sciences)

**Student's Major:** Biochemistry

CK2 is a Ser/Thr kinase that is highly conserved in all eukaryotes and is vital for cell autonomous (cell division) as well as higher order (developmental) functions. Mutations in CK2 are recessive lethal, and heterozygous yeast, fruit flies, and mice display normal cellular, physiological, and developmental functions. Thus, halved dosage of CK2 is sufficient for normal cell/organismal biology. It was therefore unexpected that a human neurodevelopmental disorder, 'Okur-Chung's neuropathy', is linked to >10 mutations in the catalytic subunit CK2 $\alpha$ . While these mutations affect residues which are invariant in metazoan CK2, their impact on structure and/or function remains unaddressed. The studies described here aim to better understand the effects of the D175G mutation, which lies within the active site and is thought to stabilize Mg<sup>2+</sup>-ATP-binding. It is hypothesized that D175G should impair kinase activity, but not affect interaction with the regulatory subunit, CK2 $\beta$ , which is essential for kinase functions in vivo. CK2-D175G has been generated by PCR-based mutagenesis and verified by Sanger sequencing. This mutant has been cloned into vectors allowing for inducible (GAL1/10 promoter) expression in yeast as well as for protein-protein interactions. These recombinant plasmids have been introduced into relevant yeast strains to test the central hypothesis (see above). The studies described employ structural modeling, bioinformatics and sequence alignments, yeast complementation assays, and yeast two-hybrid interaction analyses to determine the consequences of the D175G mutation on CK2 structure and function. The implications of these studies are discussed.

**Funding:** Federal (NASA)

**Program/mechanism supporting research/creative efforts:**

Biology 486 capstone

**Poster #40**

Integrative species delimitation in Californian striped coralroot orchids

**Mathilda Santee\*, Nicole Fama\*, Brandon Sinn, and Craig Barrett**

*Department of Biology, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Biology (Sciences)

**Student's Major:** Biology

*Corallorhiza striata* (striped coralroot) is a rare, leafless orchid found in the western United States, Canada, and Mexico. This species is fully reliant upon ectomycorrhizal fungi to obtain energy, which are in turn mutualists with trees. Our main goal is to determine if separate populations have become genetically distinct. We hypothesize that populations in the Coastal Ranges of California and the Sierra Nevada may have evolved as separate species from environmental niche differences or association with different fungal hosts. We performed CTAB DNA extractions of specimens collected from coastal California, the Sierra Nevada, and Oregon populations. We performed PCR on the extracted DNA using plant nuclear ITS, the non-functional plastid *rbcL* pseudogene, and fungal ITS primers, and conducted Sanger sequencing. Preliminary data based on fungal host nuclear ITS show that the coastal populations of *C. striata* do not associate with the same fungal host genotypes as do Sierra Nevada populations, which tend to associate with a single clade within a single species of host fungi, *Tomentella fuscocinerea*. Together with morphological data, fungal associations and plant genetic distinctness provide evidence of divergence among Coastal and Sierran populations. Our findings have led to a better understanding of the evolutionary history of the genus *Corallorhiza*. We plan to conduct genotyping-by-sequencing, a genomic technique to determine evolutionary history, environmental niches, and evolution of the fungal hosts of the species. The ultimate goal is to test the hypothesis that Californian populations represent two distinct species, which will profoundly affect conservation efforts of this rare orchid.

**Funding:** Institutional (WVU Department of Biology, WVU PSCoR Grant, and the American Orchid Society)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #41**

The Genetic Underpinnings of Symbiosis Between The Ambrosia Beetle *Euwallacea Validus* and *Fusarium Oligoseptatum*

**Fady Wasef,\* Elaina Spahr, and Teiya Kijimoto**

*Division of Plant and Soil Sciences, Natural, West Virginia University, Morgantown, WV, 26505*

**Field (Broad Category):** Biology (Sciences)

**Student's Major:** Biology

Ambrosia beetles are a diverse group of beetles in weevil subfamilies that have a symbiotic relationship with fungi. This study particularly focuses on the genetic underpinnings of the relationship between the Asian ambrosia beetle *Euwallacea validus* and its fungal symbiont *Fusarium oligoseptatum*. The beetle *E. validus* has been observed to “farm” the fungi, with the aid of its mycangia, a novel structure that females use to transport fungal spores. Aside from being the only source of food for *the E. validus*, *F. oligoseptatum* is important to our research because it produces macroconidia of a novel, shortened shape. In our research we took a targeted gene approach, the first aim of this study is to explore the effect of the gene *tracheless* in *E. validus* on the development of the mycangia, by knocking it down with RNAi. The second aim is to explore the effect of the gene *mes1* in *F. oligoseptatum* on the development of the fungal macroconidia, by knocking the gene out through fungal transformation. The results of RNAi will be in the form of micro-CT scanned images of the beetles, to observe changes to the mycangia. For the fungi, the size of the produced macroconidia will be compared to that of untreated individuals. At the end of this study we aim to increase our understanding of the evolution and maintenance of the symbiotic relationship between the two organisms as well as the methods by which organisms develop evolutionary novelties.

**Funding:** Federal (USDA NIFA)

**Program/mechanism supporting research/creative efforts:**

Biology 486 capstone

**Poster #42**

The Contribution of Serotonin in the Olfactory System to the Circadian Rhythm

**Alexia Williams,\* Ethan Mick,\* and Andrew Dacks**

*Biology Department, West Virginia University, Morgantown, WV, 26506*

**Field (Broad Category):** Neuroscience (Sciences)

**Student's Major:** Psychology

In animals, the circadian rhythm is essential for animals to produce the right behaviors at the appropriate time. The mechanisms that the circadian neurons utilize to enforce these behaviors upon the rest of the brain is an area of active study. It is known that serotonin cells receive input from the circadian neurons, and that this causes a natural sleep and wake cycle. In this study, we are over-expressing a potassium channel in the two serotonin cells that project through the olfactory system of *Drosophila*. Because these potassium channels are being over-expressed, the serotonin cells will become less active and release less serotonin. To determine if the manipulation affects circadian rhythm, the daily activity of the flies with the reduced activity in their serotonin neurons will be compared to the parental control flies' activity over the course of five days. The daily activity is measured in an automated daily monitoring device. We hypothesize that decreasing serotonin neuron activity will decrease the activity of the flies throughout the day because serotonin enhances odor sensitivity in other species of insects.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #43**

Mapping Histamine Gated Chloride Channels within the Neurons of the Fruit Fly (*Drosophila Melanogaster*)

**Marryn Bennett,\* Kaitlyn Boone, and Andrew Dacks**

*Department of Biology, Life science building, Morgantown, WV 26505*

**Field (Broad Category):** Neuroscience (Sciences)

**Student's Major:** Biology

To fully understand the physiology of an animal it is necessary to first understand the anatomy of said animal. This is why it is important to understand the function and distribution of the neurons within the brain before concluding how they contribute to the motor functions of the animal. The purpose of this study is to map the corollary discharge circuit in the fruit fly brain and central nervous system. A corollary discharge circuit has been previously defined as a circuit within the brain that provides a comparison of predicted sensation to actual sensation. The histamine gated chloride channels within *Drosophila Melanogaster* are involved in a corollary discharge circuit and are crucial to the understanding of the animal's motor function. Staining for histamine using immunohistochemistry and transgenic tools will allow for the better understanding of the anatomy of this corollary discharge circuit and how it affects motor function. This anatomy to physiology concept is important for the future of neuroscience because it is the basis for understanding neurological processes within any organism. This can then be used to better the understanding of neurological diseases in humans and how to properly treat them.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #44**

Mobile Brain-Computer Interface using CCA space partitioning and Heuristic Target SSVEP Identification

**Kirsten Johnson\* and Omid Dehzangi**

*Rockefeller Neuroscience Institute, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Neuroscience (Sciences)

**Student's Major:** Biology

Brain Computer Interface (BCI) devices that utilize electroencephalography (EEG) to translate involuntary cerebral activity into computer commands as a means of non-verbal communication have generated heavy research interest. Nevertheless, these devices have demonstrated drawbacks that inhibit their use outside of a laboratory setting; most notably, lack of reliability, portability, and target accuracy. Past methods of data analysis on our highly portable BCI system, consisting of a wireless EEG device recording data based on visual stimuli displayed on an Android screen, have involved partitioning the score spaces of Canonical Correlation Analysis (CCA) to determine the maximum value and thus the target frequency; however, this method does not consistently identify the correct frequency value. As such, we propose three new methods of extracting maximum values from partitioning spaces in an effort to both extend the use of BCI systems and increase system accuracy. In the first method, we find the difference between the first maximum and the second maximum in the entirety of the partition space. In the second method, similar to the first method, we determine the difference between the first maximum and a second maximum; however, we do so outside of a set distance from the first maximum. Finally, we employ a reverse model for comparison. Our results show that the proposed heuristic objectives were effective to improve the partition maximum only decision measure and increase the accuracy of the SSVEP identification system to 88.65% averaged leave-one-out SSVEP identification accuracy over the recruited population of 10 subjects.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

My efforts were mainly voluntary.

**Poster #45**

Feeding Rats Diets with Apple Pomace Altered Lipid Metabolism in Non-Alcoholic Fatty Liver Disease

**Minahal Naveed,\* R. Chris Skinner, Derek Warren, Garima Agarwal,\* Vagner Benedito, and Janet C. Tou**

*Division of Animal and Nutritional Sciences & Division of Plant and Soil Sciences, Davis College of Agriculture, Natural Resources, and Design, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Biochemistry (Sciences)

**Student's Major:** Biochemistry

Global prevalence of non-alcoholic fatty liver disease (NAFLD) has been attributed to obesity resulting from Western diet (high fat and sugar) consumption. NAFLD is characterized by disturbances in hepatic lipid metabolism due to increased release of fatty acids and cytokines from adipose tissue. Currently, NAFLD is treated by diet intervention. Processing of apples generates the byproduct, apple pomace, that is costly to dispose of and contributes to environmental pollution. Yet, apple pomace has a beneficial nutrient composition. The study objective is to investigate the caloric replacement of diets with apple pomace on lipid metabolism in NAFLD. Young (age 28 d) female Sprague-Dawley rats were randomly assigned to be fed standard AIN-93G diet, AIN-93G with 10% apple pomace (AIN/AP), Western diet or Western with 10% apple pomace (Western/AP) for 8 weeks. Results showed apple pomace influenced lipid metabolism indicated by higher ( $p < 0.05$ ) hepatic palmitic, palmitoleic, and oleic acid and lower ( $p < 0.01$ ) gonadal adipose palmitic, stearic, and oleic acid in rats consuming Western compared to Western/AP. Additionally, real-time quantitative polymerase chain reaction showed upregulated gene expression of nuclear transcription factor kappa B (NFkB), and inflammatory cytokines, tumor necrosis factor alpha (TNF $\alpha$ ) and interleukin-6 (IL-6) in liver and adipose of rats fed Western but not Western/AP diet compared to rats fed AIN diets. Results indicate caloric substitution of Western diet with 10% apple pomace reduced fatty acid and cytokine transport from the adipose and deposition in liver. Therefore, apple pomace has the potential to be repurposed as a sustainable dietary intervention for NAFLD.

**Funding:** Institutional (WVU & Hatch WVA 1017641)

**Program/mechanism supporting research/creative efforts:**  
capstone course within my department

**Poster #46**

Loss of Brca2 in Bone Marrow Microenvironment Compromises Hematopoietic Stem Cell Function in Mice

**Manar Chowdhury,\* Limei Wu,\* Zhilin Ma,\* Xue Li,\* and Wei Du\***

*Department of Pharmaceutical Sciences, School of Pharmacy, West Virginia University, Morgantown, WV 26506\**

**Field (Broad Category):** Pharmaceutical Sciences (Sciences)

**Student's Major:** Biology

Fanconi anemia (FA) is a rare inherited disorder characterized by bone marrow (BM) failure and high risk of neoplasia including leukemia from dysfunctional hematopoietic stem cells (HSCs). In around 3-5% of cases, FA is caused by biallelic mutations in BRCA2 (FANCD1) genes. However, how BRCA2 functions in BM microenvironment remains elusive. By employing a conditional Brca2 knockout mouse model (Brca2f/fPrxx1Cre mice), which deletes Brca2 specifically in BM mesenchymal stroma cells (MSCs), here the role of Brca2 in BM niche was investigated. It was found that the mice lack of Brca2 in MSCs exhibit some developmental defects, including reduced size, and decreased body weight. Beta -Galactosidase staining indicates an in vitro premature senescent phenotype of MSCs from Brca2f/fPrxx1Cre mice compared to those from WT littermates. Although the proportions of Brca2f/fPrxx1Cre LSK (Lin-Sca1+c-kit+) and SLAM (LSKCD48-CD150+) cells are not significantly different from those in WT mice, Brca2f/fPrxx1Cre hematopoietic stem progenitor cells (HSPCs) show reduced colony forming unit (CFU). Furthermore, HSPCs from Brca2f/fPrxx1Cre mice exhibit a slightly increased repopulation capacity and a myeloid differentiation bias in the lethally irradiated recipients using a well-established competitive BM transplantation assay. Although further investigation remains needed, the findings suggest that deletion of Brca2 in the BM microenvironment affects normal hematopoiesis and reveal a novel role of Brca2 in regulating HSC homeostasis through maintaining BM microenvironment integrity.

**Funding:** Federal (NIH)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Poster #47**

Challenges and Perceptions of Recruiting Patients for Addiction Research Project

**Megan Russell,\* Krystal Hughes, Mai Do, Vince Setola, David Siderovski, Laura Lander, James Berry, and Marina Peralta Galvez**

*School of Pharmacy, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Pharmaceutical Sciences (Sciences)

**Student's Major:** Biology & Psychology

The United States is currently suffering from a severe opioid epidemic, with the heart of the issue centered around Appalachia. Recently, this problem has climaxed and is at the forefront of public attention. With this heightened public attention, comes critiques and beliefs surrounding substance abuse which has the potential to place a negative stigma on those suffering from addiction. The goal of this study is to identify traits and trends in the backgrounds of patients who are willing to participate in addictions research. Demographic information was collected from patients enrolled in the Comprehensive Opioid Addiction Treatment (COAT) Clinic who chose to participate in a genomics research study. In total, data from 100 patients was collected. The data will be analyzed to investigate whether significant trends in background are evident in those who choose to participate in research studies. Such demographic data that will be analyzed includes gender, age, education level, age of first exposure, and the current status of treatment progress. It is hypothesized that patients who are further along in their treatment progress and have a less extensive history of exposure will be more likely to participate in opioid addiction research. Overall, the poster will discuss, from personal perception, the role stigma has on opioid addiction treatment and how this affects the ways in which patients' view themselves and their treatment progress. The poster will also include personal experiences detailing the challenges associated with recruitment.

**Funding:** Institutional (CTSI)

**Program/mechanism supporting research/creative efforts:**

My efforts were mainly voluntary.

## Session IV (1:50-3:30 pm) – Health Sciences

### Poster #48

Health Narrative of Patients Receiving Palliative Care: A Secondary Analysis

**Alysia Paesano,\* Sarah Coddington, and Rondalyn Whitney**

*Occupational Therapy Department of the School of Medicine, West Virginia University, Morgantown, WV  
26506*

**Field (Broad Category):** Other (Health Sciences)

**Student's Major:** Occupational Therapy

Palliative care is provided by a multi-professional healthcare team for patients diagnosed with a terminal illness. This study used a qualitative narrative analysis approach to analyze the embedded themes of occupation in 24 patient narratives collected from patients at the West Virginia University Cancer Center receiving palliative care. By presenting and analyzing narrative through patients' own eyes, their values and concerns are expressed and become evident in an intimate way. The overall purpose of this study was to contribute to the development of palliative care treatment by identifying what patients living with a terminal diagnosis want to do and like to do at end of life. The analysis adds to the scientific knowledge on palliative care in relation to the decision-making of healthcare professionals during the time of palliative care and overall quality of life for patients at the end of life. There has been little research to date conducted on palliative care in relation to the decision-making of healthcare professionals in palliative care.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**  
capstone course within my department

**Poster #49**

An Analysis of Medical Terminology and Defiant Patients

**Tabatha Palomo\* and Catherine Gouge**

*English Department, West Virginia University, Morgantown, WV, 26506*

**Field (Broad Category):** Other (Health Sciences)

**Student's Major:** Philosophy

While patient treatment and prejudice has been widely examined in the health and humanities program, this paper explores the area of medical terminology—specifically, the history and treatment of patients labelled as “difficult” or “defiant”. The researchers of this project explore how health professionals and institutions have responded to non-compliant patients through archival methods. The archival data is collected from the Wellcome Library’s digital database, where patient records have been extracted from Ticehurst Hospital from 1846-1941, and supplemented by firsthand accounts by patients and a historical analysis of the asylum’s methods. To be used as case studies, the researchers are currently pulling records from the archives that relate to one or more of the following themes: female patients, hysteria, disobedient behavior, and violent behavior. The aim for this research is to adjust how healthcare professionals react to non-compliance, and instead see such behavior as an indicator that the patient sees the type or intensity of treatment as undesirable. As this is an early work-in-progress, there are no reported trends or conclusions in the research at this time.

**Funding:** Federal (Federal Work Study)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #50**

Generation of a Lentivirus-based Vector to Elucidate the Role of IRF4 in Monocyte Differentiation

**Kelsey F. Wright\* and Edwin C.K. Wan**

*Department of Microbiology, Immunology, and, Cell Biology; Department of Neuroscience, West Virginia University School of Medicine, Morgantown WV, 26506*

**Field (Broad Category):** Other (Health Sciences)

**Student's Major:** Immunology and Medical Microbiology

Monocytes are innate immune cells that are critical for host defense against pathogens. Monocytes normally reside within the bone marrow and the blood, but they migrate to the site of infection during pathogen invasions where they differentiate into either dendritic cells or macrophages. Dendritic cells present antigens to the CD4+ T cells, which amplify immune responses by activating adaptive immunity, whereas macrophages destroy pathogens through direct engulfment. Currently, it is not clear how monocytes decide to differentiate into dendritic cells or macrophages. We hypothesize that transcription factor IRF4 is a key protein that differentiates monocytes into dendritic cells, but not into macrophages. This question can be addressed by overexpressing IRF4 in monocytes through viral infection, followed by observing their differentiation. The goal of this study is to construct a lentivirus-based vector that contains the IRF4 gene. Here, we report that this vector had been successfully constructed by the following steps: 1) generating the IRF4 gene through polymerase chain reaction, 2) using restriction enzymes to cut and linearize the lentiviral vector, 3) inserting the IRF4 gene into the linearized vector, 4) transformation of the IRF4-containing vector into bacteria, 5) selecting bacterial colonies that contain the correct viral construct, and 6) mass production of the viral construct. This construct will be used for generating the IRF4-containing lentivirus.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #51**

Taking on Metastatic Cancer

**Connor Romestan,\* Samuel Sprowls, and Tasneem Arsiwala**

*1 Medical Center Drive, Morgantown WV, 26505*

**Field (Broad Category):** Pharmaceutical Sciences (Health Sciences)

**Student's Major:** Chemistry

During my time at my lab, I have learned many key pieces that will help me in my future. In my lab I have learned how to culture cells, split cells, split mice brains, stain mice brain slices, and numerous other techniques. Our overall goal in the Lab is permeability of the blood-brain barrier. We measure how well drugs permeate through the blood-brain barrier (BBB) and what the ideal size and concentration of drug will successfully terminate a tumor and make the tumor shrink in size or completely terminate with as little harm to the individual as possible. The blood-brain barrier has a filtration system on it in which is used to filter hostile objects flowing in the bloodstream and stops it from entering the brain. This poses a problem for drug delivery without installing drugs directly into the brain (extremely dangerous). My lab focuses their attention on the blood-brain barrier and how well drug saturates through the BBB. To conclude the blood-brain barrier is necessary for human survival, however, when the individual's life is at risk, the blood-brain barrier is a very big speed bump.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #52**

Tobacco Sales: Student Pharmacist Views

**Smith, Kailey;\* Kelly, Kimberly; Rai, Pragya; Agarwal, Parul; Scott, Virginia; Elswick, Betsy;  
Tworek, Cindy**

*School of Pharmacy, West Virginia University, Morgantown WV 26506*

**Field (Broad Category):** Pharmaceutical Sciences (Health Sciences)

**Student's Major:** Pharmacy

The use of tobacco products is associated with an increased risk of diseases, including lung cancer, heart disease, and liver cancer. Along with their role in counseling for tobacco cessation, pharmacists are increasingly being authorized by state legislatures to provide smoking cessation therapies, and student pharmacists must learn about ways to prevent the use of tobacco products. The purpose of this study was to explore psychosocial factors associated with tobacco sales in community pharmacies by student pharmacists (n=232). PharmD students were identified using listservs at the schools of pharmacy in West Virginia (n=3). Participants responded to a cross sectional survey to indicate their interest in tobacco cessation. Most student pharmacists had completed a community rotation (82%), some had completed a hospital rotation (35%), or an academic rotation (21%). In addition, 14% of participants were current smokers, and 14% of participants had smoked at least 100 cigarettes in their life. A logistic regression model showed that a greater probability of not selling tobacco products was associated with less difficulty to stop sales, lower visibility of tobacco products in pharmacies, and awareness of the 2012 AMA policy about pharmacies not selling tobacco products (p values <.05). Knowledge of APhA policy was associated with greater probability of selling tobacco products, which calls for further investigation. It was found that 74.4% of participants either agreed or strongly agreed that pharmacies should not sell tobacco products. Results indicate that a majority of student pharmacists believe that tobacco should not be sold in a pharmacy setting.

**Funding:** Institutional (Department of Pharmaceutical Systems and Policy)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #53**

Attitudes, Beliefs, and Behaviors of Occupational Therapists Regarding Marijuana Use

**Lauren Magee,\* and Randy P. McCombie**

*Lauren Magee, OTS, & Randy P. McCombie, PhD, OTR/L, Division of Occupational Therapy, School of Medicine, West Virginia University, Morgantown, WV, 26506*

**Field (Broad Category):** Physical/Occupational Therapy, Speech Language Pathology & Audiology (Health Sciences)

**Student's Major:** Occupational Therapy

Marijuana is currently the most commonly used illicit drug in the US. Legalization of marijuana for medical and/or recreational purposes has spurred significant debate among all segments of society, including among health care professionals. The purpose of this study was to survey one grouping of health care professionals, occupational therapists, and examine their attitudes, beliefs, and behaviors specific to marijuana use. A national sample of 500 occupational therapists was randomly selected from membership in the national OT association. Following IRB approval, participants were postal mailed survey packets including a multi-page questionnaire targeting usage, reasons for use, and attitudes and beliefs specific to marijuana use in general. One hundred ninety-five surveys (39%) were returned, having a mean age of 55.89 (sd = 91.21), ranging from 42 to 85. The majority (n = 133, 69.3%) reported marijuana was legal in their state for medicinal purposes, but not for recreational purposes (n = 153, 80.1%). While few OTs (n = 14, 7.2%) had ever used marijuana for medical reasons, a significantly larger percentage (n = 82, 42.7%) reportedly used marijuana for recreational purposes, although for most, not within the previous five years. Analyses revealed a lack of consistency among users regarding their reasons for marijuana use. Significant differences were found in regard to agreement ratings of attitude and belief statements based on state legalization, and whether or not they had ever used marijuana. Discussion addresses these results in relation to national legalization trends, reported health concerns, and usage by other health care professionals.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**  
a WVU 497-level course

**Poster #54**

Experimental Drug to Stop the Spread of HNSCC

**Lily Cessna,\* Scott Weed, Jessica Allen, and Natalie Mastroianni\***  
*Department of Biochemistry, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Biochemistry (Sciences)

**Student's Major:** Immunology and medical Microbiology

This year, an estimated 64,690 people (47,650 men and 17,040 women) will develop head and neck cancer. The research my lab is conducting is focused on the spread and invasion of cancer cells which are responsible for mortality as well as head and neck squamous cell carcinoma (HNSCC). HNSCC is prevalent in people who use tobacco, alcohol, or who have HPV. HNSCC invasion damages the soft and bony tissues of the craniofacial region, severely compromising local organ structure and function. The goal of the study is to investigate the effectiveness of Andecaliximab in stopping HNSCC. While Andecaliximab has not yet been found to stop the spread of HNSCC, more trials are needed to understand its full effectiveness. Currently, we are using two different controls which are dimethylsulfoxide and IgG, Marmistat, a drug that is known to stop HNSCC and Andecaliximab, the experimental drug to compare the results. The cells are made into spheroids, the different drugs are placed on the spheroids and then measured at two different time points to compare growth. While results show Andecaliximab is ineffective, future studies may change this.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Poster #55**

The Role of Mitochondrial Transcription Factor A in Retinal Metabolism and Viability

**Allison Hauer,\* Jiancheng Huang, Siyan Zhu, Michelle Yam, William Gu\*, and Jianhai Du**  
*Du Lab, WVU Eye Institute, Morgantown, WV 26506*

**Field (Broad Category):** Biochemistry (Sciences)

**Student's Major:** Biochemistry

Age-related macular degeneration (AMD), glaucoma, and diabetic retinopathy account for more than 25% of blindness throughout the world, all linked to a common denominator: mitochondrial dysfunction. Proper mitochondrial function is imperative to provide the energy needed for photo-transduction, phagocytosis debridement, and the synthesis of intermediates in the high-energy demanding retina. However, the detailed mechanism surrounding how mitochondrial dysfunction contributes to retinal diseases remains unclear. Mitochondrial integrity depends upon mitochondrial DNA (mtDNA) whose transcriptional activity and levels are regulated by Mitochondrial Transcription Factor A (TFAM). To understand the role of mitochondrial metabolism in retina diseases and establish a mitochondrial dysfunction disease model, we generated retina specific TFAM Knockout (KO) mice. The deletion of TFAM was confirmed with PCR. Electroretinography (ERG) was utilized in assessing retinal function while IHC, H&E, OCT, and flat mounts examined tissue morphology. Results demonstrate a significant reduction in ERGs and retinal thickness for all layers comprising the retina in TFAM KO mice, indicating TFAM is essential to maintain retinal function and viability. As a key regulator of mtDNA levels & transcriptional activity, TFAM's role in retinal viability and function establishes a concrete mitochondrial dysfunction model. Applicable to multiple eye diseases, this model can serve to explore new preventative and restorative treatment possibilities.

**Funding:** Private (BrightFocus Foundation)

**Program/mechanism supporting research/creative efforts:**  
capstone course within my department

**Poster #56**

Data Mining for Mitochondrial Proline Transporters

**Max Hollmeyer,\* Jianhai Du, and Rui Zhang**

*WVU Eye Institute 1 Medical Center Drive Morgantown, WV 26506*

**Field (Broad Category):** Biochemistry (Sciences)

**Student's Major:** Biochem

Retinal pigment epithelium (RPE), a monolayer of cells in the back of eye, is essential for the function and viability of photoreceptor neurons. Our lab reported recently that RPE but not photoreceptor prefers to use proline as a nutrient for mitochondrial metabolism. Two mitochondrial proline transporters are characterized by functional assays but the genes encoded these transporters are unknown. The goal of this study is to mine the databases to identify the candidate genes for mitochondrial proline transporters. We search the expression of 1158 genes that encoded mitochondrial proteins in the MitoCarta 2.0 database in two RNAseq databases. The first RNAseq database (RPE-retina database) has expression of human RPE and retina. The second database (RPE differentiation database) has the expression data of human RPE at differentiated and de-differentiated RPE. Because RPE uses proline 50 X higher than retina and only differentiated RPE uses proline. As a result, we found the expression known genes in proline metabolism is >8 X higher in RPE than retina in the RPE-retina database). Similarly, these known genes express >10 X higher in differentiated than de-differentiated RPE. Therefore, we select candidate mitochondrial genes that expresses >2.5 X higher in RPE in both databases with transmembrane domains. In the future study, we will validate the function of genes by overexpressing them in cells and screening with mass spectrometry for proline catabolism.

**Funding:** Institutional (WVU)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #57**

Comorbidity of Peripheral Viral Infections and Diabetes in Etiology of Alzheimer's Disease

**Noor Malik,\* Tiffany Petrisko, and Gregory Konat**

*Department of Biochemistry, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Neuroscience (Sciences)

**Student's Major:** Biochemistry

In the US , more than 100 million individuals have been diagnosed with Diabetes mellitus type 2 (DM2). DM2 patients also have a higher risk of developing Alzheimer's disease (AD). Since AD predominantly affects the aging brain, we hypothesize that viral infections, which become more frequent in the aging population, may provide the link between DM2 and AD. The present pilot study was undertaken to test this link in an experimental setting. Briefly, 6-month old C57BL/6J female mice were intraperitoneally (i.p.) injected with 50mg/kg streptozotocin (STZ) daily for 5 days to induce diabetes. After 21 days, their fasting blood glucose levels were examined to confirm the diabetic phenotype. On days 26, 31, and 36, one half of the animals received i.p. injections of 2.5mg/kg of polyinosinic: polycytidylic acid (PIC), a viral mimetic, whereas the other half was injected with equivolume saline. On Day 42, the animals were euthanized, and their brains removed for immunohistochemical analysis. Ongoing immunohistological studies are examining if PIC challenge increases levels of beta-amyloid and phosphorylated tau, the hallmarks of AD in the diabetic mice. Also, microglia, the primary immune cells of the brain, will be examined to determine their proliferation and/or hypertrophy. The results are expected to provide a proof-of-concept for the comorbidity of DM2 and peripheral viral infections in the etiology of AD.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

My efforts were mainly voluntary.

**Poster #58**

Development of Virtual Reality Tools for Stroke Patient Rehabilitation

**Madeleine Weber,\* Ariel Thomas, and Valeryia Gritsenko**

*WVU Rockefeller Neuroscience Institute*

**Field (Broad Category):** Neuroscience (Sciences)

**Student's Major:** Engineering Track 1

The goal of this study is to find a new way to aid stroke patient muscle control rehabilitation by using electrical stimulation. Stroke patients would be asked to come in and have surface EMG's attached to their affected arm. Muscle electrical activity would then be recorded and analyzed. My assignment was to create a Virtual Reality game that could be used in conjunction with motion capture technology. This game would be played by a stroke patient with arm or shoulder muscle control problems and would involve them moving the affected limb in a reaching motion repeatedly. The motion capture device would attach to the patient's headset and follow their hand movements, allowing physicians and/or researchers to track the patient's progress. The creation of virtual rehabilitation allows the patient to complete their treatment wherever a computer and headset is available, including from the comfort of their own home. The utilization of mobile technology and stroke rehabilitation research in general is important because lowering recovery time and increasing muscle control can help stroke patients regain independence and improve their overall quality of life.

**Funding:** Institutional (WVU)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #59**

Sigma-1 Receptor Modulation of Mitochondrial Structure, Function and Movement in Transgenic Alzheimer's Diseased Neurons

**Mark A. Colantonio\* and James W. Simpkins**

*Department of Physiology and Pharmacology, West Virginia University School of Medicine, Morgantown, WV 26506*

**Field (Broad Category):** Other (Sciences)

**Student's Major:** Biochemistry

Alzheimer's disease (AD), the most common neurodegenerative disease, accounts for nearly 80% of all individuals afflicted with dementia. AD is known to inflict permanent cognition deficits, such as memory loss and confusion. Several studies have indicated mitochondria loss and dysfunction may play an important role in the progression of AD. Although there is currently no cure for AD, small-molecule therapeutics targeting specific intracellular receptors are of significant interest for treatment. This study analyzed the effect of sigma-1 receptor ( $\sigma_1R$ ) activation by (+)SKF-10047 [(+)-N-Allylnormetazocine hydrochloride] on triple transgenic (3xTg) and non-transgenic (NonTg) mouse cortical neuronal mitochondria structure, function and movement. 3x-Tg AD mitochondria attained a significantly greater area ( $p < .05$ ) and length ( $p < .01$ ) prior to treatment. Administration of (+)SKF-10047 significantly decreased the circularity of both WT and 3x-Tg AD neuronal mitochondria ( $p < .05$ ). A significant increase in mitochondrial area ( $p < .05$ ) and length ( $p < .01$ ) was associated with both NonTg and 3x-Tg-AD mitochondria, regardless of treatment. The effects of (+)SKF-10047 on mitochondrial movement was examined, as diminished movement is characteristic of AD. A trend of increasing velocity was observed post treatment with (+)SKF-10047; however, no significant differences regarding mitochondrial movement were observed. Last, mitochondrial function as measured by adenosine triphosphate (ATP) output was examined. Meaningful results may provide insight into potential novel, small-molecule therapeutics for AD and related neurodegenerative diseases.

**Funding:** Federal (National Institute of Health)

**Program/mechanism supporting research/creative efforts:**  
capstone course within my department

**Poster #60**

Development of Magnetic Resonance Probes for Imaging of Matrix Metalloproteinase in Breast Cancer

**Justin Huffman,\* and Benoit Driesschaert**

*Pharmaceutical Sciences and In vivo Multifunctional Magnetic Resonance Center, Health Sciences Center, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Pharmaceutical Sciences (Sciences)

**Student's Major:** Chemistry

Breast cancer is the most frequently diagnosed cancer worldwide with about 1.7 million new cases each year. Matrix metalloproteinases-2/9 (MMPs) are enzymes involved in the degradation of the extracellular matrix and are overexpressed in invasive breast cancer. In addition, the measurement of MMP's directly in vivo remains extremely challenging. The goal of our project is to develop advanced magnetic resonance contrast agents allowing for the imaging, in real time and non invasively, of MMP's activity in a live animal. Our strategy is based on a modification of the electron paramagnetic resonance (EPR) spectrum of a stable triarylmethyl (TAM) radical upon the action of MMP's. This change in the EPR spectrum can be acquired by an EPR scanner to measure MMP activity in vivo. TAM radicals are superior spin probes for EPR imaging as they exhibit high stability in biological milieu, good water solubility, a favorable EPR spectrum, and non-toxic properties. Moreover, our strategy uses an organic radical as a contrast agent unlike many commonly used ones based on paramagnetic metals such as gadolinium, manganese, iron, etc. with an increased concern related to their accumulation and toxicity.

**Funding:** Federal (NIH/NIBIB)

**Program/mechanism supporting research/creative efforts:**

My efforts were mainly voluntary.

**Poster #61**

To Stretch or Not to Stretch: A Study Comparing Neural Activity with or without a Pre-Contraction Stretch

**Cassidy Pinion,\* Justine Brown,\* and Mikaela Mitchell\***

*Exercise Physiology School of Medicine, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Exercise Science & Nutrition (Sport Science/Psychology)

**Student's Major:** Exercise Physiology

Abstract intentionally not included because it may contain proprietary information.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #62**

Drug- and Arthritis-induced Suppression of Digging Behavior in Mice

**Asia Taylor,\* Floyd Steele,\* and Steven Kinsey**

*Life Science, Department of Psychology, West Virginia University, Morgantown , WV26505*

**Field (Broad Category):** Psychology (Sport Science/Psychology)

**Student's Major:** multidisciplinary studies

Rheumatoid arthritis (RA) affects approximately 1.3 million U.S. adults. While there exist efficacious RA treatments, none of them are without negative side effects. Cannabinoid drugs show anti-inflammatory efficacy in mouse models of chronic inflammation. The purpose of this study is to use the endogenous cannabinoid system to attenuate inflammation and functional deficits in a mouse model of arthritis. To induce arthritis, a collagen-induced arthritis model was used in which mice are given two injections of bovine collagen. Each day after the second injection, mice will be given a subcutaneous injection of either the cannabinoid enzyme inhibitor JZL184 (40 mg/kg) or a vehicle solution. JZL 184 is an inhibitor for monoacylglycerol lipase, the primary enzyme responsible for degrading the endocannabinoid 2 -. arachidonoyl glycerol Fifteen days after the second injection, mice will be subjected to a digging assay in which mice were placed in a cage filled with about 5 cm deep with wood chips bedding. Once the mice are placed in a cage and a timer starts. At that time mice are recorded for 3 minutes on the number of digging bouts and total duration of digging. It is hypothesized that the CIA will decrease digging relatively to control and that JZL184 treatment will restore digging in these animals. This restoration of behavior may generalize to RA populations afflicted with arthritis-related functional deficits. This study is expected to inform alternative strategies for treating rheumatoid arthritis.

**Funding:** Other (n/a)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Poster #63**

Turning on a Split-Belt Treadmill Using Virtual Reality

**Lindsay Reese\*, Matthew Boots, Anton Sobinov, Trevor Moon and Sergiy Yakovenko**  
*Erma Byrd Biomedical Research Center, Morgantown, WV 26506*

**Field (Broad Category):** Engineering (Health Sciences)

**Student's Major:** Exercise Physiology

Damage to neural, muscular, and/or skeletal systems can cause permanent damage to mobility and quality of life. Gait rehabilitation using treadmill locomotion remains to be the standard of care for people with limited lower-limb mobility. However, the carry over benefits from the split-belt treadmill training to the over ground locomotion have not been extensive. The reduced benefit is likely due to the forced rather than self-paced (SP) control of treadmill speed and incongruent peripheral vision feedback preventing the consolidation of multi-system neural control. Thus, our goal was to implement a congruent control of limb asymmetry and to provide appropriate visual feedback using VR. We have developed an algorithm that uses the ground reaction forces and moments from each limb to compute speeds of both limbs that were used to drive the corresponding treadmill belts. In addition, we use limb speeds to simulate congruent changes in the forward progression and the changes in the heading direction. The current implementation executes in real-time with human-in-the-loop navigating within standardized VR environment. The subjects can be challenged to match experimental randomized heading direction and their performance is updated with real-time latencies. The integrated self-paced treadmill with congruent VR can potentially improve gait rehabilitation or enable realistic omnidirectional navigation in VR environments for healthy subjects, e.g., for fitness applications or the training of first responders in dangerous scenarios.

**Funding:** State (West Virginia Clinical and Translational Science Institute)

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

## Session IV (1:50-3:30 pm) – Human Engagement

### **Poster #64**

“German Measles”: German Involvement in the Formation of the Japanese Beer Industry

**Lauren Griffin\***

*Department of History, West Virginia University, Morgantown, WV, 26506*

**Field (Broad Category):** History (Humanities)

**Student’s Major:** International Studies, History

During the Meiji Era (1868-1912), Japan sought new technologies and ideas from Europe and America to help modernize their society, which for roughly 200 years had been closed off from the Western World. Motivated by national security fears of imperial domination by European powers, the Japanese government subsidized Japanese education in Germany and adoption of the German military system, parliament structure, and modern inventions in order to project a strong, Westernized image to the rest of the imperial powers. As foreigners began moving to Japan and Japanese citizens began studying abroad, the demand for European beverages grew and a domestic industry began with the help of German brewmasters and trained Japanese entrepreneurs. Three of Japan’s largest beer breweries-- Asahi, Kirin, and Sapporo-- are rooted in German ingredients, techniques, and trained German masters. Beginning as an elite luxury practice, drinking beer has been converted into an everyday Japanese cultural practice. This research project explores the concept of “Germanness” in Japanese society and the development of a relationship between the two states fostered by the adoption of beer culture. By looking at press sources, accounts of diplomatic missions, and government productions, the formation of the relationship and the opinions on the position of beer in the German-Japanese modernization project become illuminated. The results will offer broader insights in the formation of the Japanese beer industry and Germany’s involvement, highlighting a small facet of a much larger process of Japanese consumption of Western culture and technology to promote a new, progressive image.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**  
capstone course within my department

**Poster #65**

Snapshot of Immigrant Life in Early 20th Century Morgantown

**Brooke Hostetler\* and Hal Gorby**

*Department of History, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** History (Humanities)

**Student's Major:** History/ Slavic and East European Studies

This project investigates the collection of data on previously understudied immigrants in Ward 2 (mostly Greenmont) and Ward 6 (Sabraton) of Morgantown, West Virginia. The data collected examines information gathered on immigrants over the course of three decades: 1910, 1920, and 1930 using census data and city directories. The primary objective is to gain further knowledge of the evolving composition of Morgantown's immigrant labor force and residential patterns. This study records the following information: where immigrants came from, where they resided within respective wards, their given immigration or naturalization years, native tongue, age, occupation, and household members. To illustrate the demographic changes in the immigrant population and labor employment within each ward, said information was consistently recorded over all three decades. The data also indicates the percentage of immigrants versus native born citizens in either ward. This study also examines labor conflicts, daily social life, and religious melding between immigrant groups using oral histories and microfilm of local newspapers from various times in each decade such as, The Dominion Post, The Daily Athenaeum, and The West Virginian. While still in the exploratory stages, current investigatory steps conclude that Italy, Greek, Hungarian, and Welsh immigrants are of the highest concentrations. Immigrants from these ethnic backgrounds worked as skilled and unskilled labors in factories, such as Marilla Glass Company, Pressed Prism Plate, and American Sheet and Tin Plate Company or the Richard Coal Mine.

**Funding:** Federal

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #66**

Insiders and Outsiders on the Gay Community in Weimar Berlin

**Jordan L. Nistendirk\* and Katherine Aaslestad**

*WVU Department of History, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** History (Humanities)

**Student's Major:** History/Poli Sci dual major

During the early twentieth century, Berlin became the world's first modern "gay capital." The forthright activism of the LGBTQ community, lax enforcement of anti-homosexuality laws, and a thriving gay nightlife culture combined to make Berlin unique. By the dawn of the "Roaring Twenties," Berlin's queer spaces were notorious tourist destinations for Americans, French, and Britons seeking to take advantage of cheap travel and explore the LGBTQ underworld that existed there. Salacious accounts of hidden nightclubs, gay revues, and queer cafés were printed across the Western world in novels and travel guides. As their community enjoyed a global spotlight, however, LGBTQ Berliners struggled with conflicts within their movement, increasing attacks from across the political spectrum, and the looming threat of police crackdowns on their spaces. This research project analyzed accounts of "Gay Berlin," from the eyes of tourists and native Germans to determine if tourist narratives accurately depicted the struggles faced by Berlin's queer community. My findings suggest that tourist accounts scarcely reflected the internal struggles and external threats faced by queer Berliners. In a climate where LGBTQ spaces are increasingly utilized by non-LGBTQ persons, it is more important than ever to remember that an outsider's narrative of the LGBTQ community may not reflect the struggles actually taking place there.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**  
capstone course within my department

**Poster #67**

Let the Storm Rage On: Reevaluating Misconceptions Regarding the Alaska Native Claims Settlement Act

**Michael V. Amato\***

*Native American Studies Program, 146 Arnold Hall, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Other (Humanities)

**Student's Major:** Political Science, History, World Languages

The Alaska Native Claims Settlement Act (ANCSA) was a piece of federal legislation signed into law in 1971 by President Richard Nixon, which sought to resolve land ownership conflicts between the state of Alaska and the over 200 indigenous groups native to the state. ANCSA has been lauded as a success as it both diffused land tensions and spurred economic development in indigenous communities. Most discussions of the "Tribal Self-Determination Era," the current phase of Federal Indian policy, include ANCSA as a landmark step in increasing tribal self-governance nationwide. But should ANCSA be viewed with such laud? Regardless of the policy era in which the Alaska Native Claims Settlement Act was formally passed, this legislation should be seen through a tribal extinguishment lens. Just like 1950s-era policies in the continental United States, such as Menominee termination for the sake of comparison, ANCSA must be viewed as a more-modern way to promote extinguishing, assimilating, and diminishing of tribes and tribal interests. Furthermore, the prevailing positive view of ANCSA exhibits both the lack of Alaska Native voice in the popular narrative surrounding ANCSA and the diversity within Alaska Native thought on the issue.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

My efforts were mainly voluntary.

**Poster #68**

An Examination of Characteristics of School Based Health Centers in West Virginia

**Danielle Quimby\* and Sara Anderson**

*Department of Learning Sciences and Human Development, West Virginia University, Morgantown, WV  
26505*

**Field (Broad Category):** Other (Humanities)

**Student's Major:** Public Health

People residing in geographically isolated areas or who are economically unstable are at higher risk of poor health, lower academic achievement, and lower quality of life. Establishing School Based Health Centers (SBHCs) in communities across the state could combat these risks by providing accessible healthcare to those with limited access to proper health services. SBHCs are located inside schools or on school property and provide a variety of health services such as medical, mental health, oral health, and nursing. As SBHCs have been utilized for over 25 years, the question arises about the characteristics of SBHCs. The purpose of this study is to examine administrative data collected on SBHCs across the state of West Virginia to understand the different health services provided, hours operated, and related features of each SBHC. Analyzing the administrative data collected on SBHCs will provide a greater knowledge of SBHC and insight to the gaps in health services across the state of West Virginia.

**Funding:** Other

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #69**

Reliability and Reproducibility of Coding Systems in Analyzing Congressional Committee Hearings

**Chase Mayo\* and Jason MacDonald**

*John D. Rockefeller IV School of Policy and Politics Department of Political Science, West Virginia University, Morgantown, WV, 26505*

**Field (Broad Category):** Political Science (Humanities)

**Student's Major:** Business

The United States Congress has Committees whose members work on specific duties that are assigned to the body. They are required by the Freedom of Information Act to produce documents that report what work was conducted during the session. In the current study, we gather documents from the Committee on Energy and Commerce ranging in time from the 90th Congress to the 114th Congress and use these as the basis of the research. The purpose of this research is to evaluate the reliability and reproducibility of a set of coding rules to evaluate Congressional Committee Hearings. Following the guidelines established in the coding rulebook, we make decisions and code them as numbers that correspond with certain variables in these hearings. These decisions are called Content Analysis which is the collection of information from these hearings that were conducted in Congress. These variables range from "Who is the Hearing being Critical of?" and "Was there legislation created out of this work". These numbers are recorded and kept for each session document. The ultimate goal of the current project is to make the coding system as reliable as possible and so that no matter who is using the coding system to make these decisions, the results are the same and there is no bias. We measure this reliability by comparing the results of two people's coding decisions and see how similar the two are. If the results are complementary more often than occurring by chance, then the coding system is a success.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #70**

Studying International Criminal Tribunals in Rwanda and Yugoslavia

**Omosede Irabor\* and Amber Brugnoli**

*Global Strategies & International Affairs, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Law & Legal Studies (Social Sciences)

**Student's Major:** Political Science

One of the most significant decades in world history was the 1990s. During this time period, the world witnessed the collapse of the Soviet Union as well as the establishment of International Criminal Tribunal in Rwanda and Yugoslavia. The tribunals were set up by the United Nations to prosecute those responsible for the abdominal acts during the wars and genocides in these regions. In this study, we investigate the individuals involved in these crimes, the current state of these tribunals (trials, Gacaca courts, etc.) and how these tragedies have affected the judicial system in these countries. The goal is to examine how the Rwandan and Yugoslavian governments deal with justice problems. We write about the declining interest in the International Criminal Tribunals and analyze the new problems and cases arising in both Rwanda and Yugoslavia. This study will also discuss whether or not the International Criminal Tribunals have been effective in managing and prosecuting those who have committed crimes. This is done through the collection of articles, newspapers, books and documentaries I have been analyzing. Through websites sponsored by the United Nations, I have discovered that the courts in both Yugoslavia and Rwanda have been following the proper procedures for prosecuting criminals guilty of atrocities committed during the genocides or other international crimes.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Poster #71**

Post-Conflict Reconstruction

**Shelby Turley\* and Amber Brugnoli**

*Global Strategies & International Affairs West Virginia University*

**Field (Broad Category):** Political Science (Social Sciences)

**Student's Major:** Political Science

The present study exams international war crimes, how the courts handled the crimes, and how that affects today's events. The researchers have done research based on publishing's that describe how political leaders have been prosecuted, final data on the International Criminal Tribunal (ICTR) for Rwanda, information regarding when the ICTR started being viewed as ineffective, many times national leaders have been tried for war crimes, and much more. The purpose of the research is to find credible, updated sources in order for Dr. Brugnoli to use in her publication of an updated paper she wrote while in graduate school, based on post-conflict reconstruction. The goal of this research is to assess the best method of seeking justice for those wronged during a conflict and how history has handled such decisions and how they will potentially be handled in the future. Data used for this study include articles and publications found online and in WVU library databases. This research will impact the way those seeking justice after a conflict is found.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #72**

Life in the Face of Death: Children in the Theresienstadt Ghetto

**Molly Plante\* and Katherine Aaslestad**

*Molly Plante Department of History, West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** History (Social Sciences or Humanities (per KA))

**Student's Major:** History

I am researching the lives of children in the ghetto-labor and transit camp, Theresienstadt. Established in 1941, Theresienstadt held a special status in the National Socialist concentration camp system as being the designated camp for privileged and famous deported Jews in the Third Reich. It was unique because it presented a façade, reminiscent of the "Potemkin Villages" in Imperial Russia, to the outside world of the ghetto-camp as a comfortable site of relocation. Within the camp, however, conditions were harsh, cruel, and incredibly inhumane, and thousands were deported to death camps in the East. It was also a camp populated with children. As often the weakest and most vulnerable members of society, I am interested in the survival of children interned in Theresienstadt. My research addresses how children survived in such conditions, and what external circumstances influenced a child's chance of survival. I am researching how an education system organized by ghetto elders functioned to shield the ghetto's youngest inhabitants from the harshest realities of ghetto life. I am examining memoirs, interviews, and video testimonies to assess common experiences responsible for children's ability to withstand the deprivations of their environment and express their personal trauma.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**  
capstone course within my department

**Poster #73**

Addressing the Lack of Scientific Materials Available to Young Kids in 4-H Groups

**Sadie Chafin\* and Edward Flagg**

*Department of Physics and Astronomy , West Virginia University, Morgantown, WV 26505*

**Field (Broad Category):** Physics & Astronomy (Sciences)

**Student's Major:** Physics

4-H is a national club organization for middle school-aged children. They teach children skills and help them develop their character. In 4-H, there is a shortage of scientific materials and resources. This research aims to aid in resolving this deficit of scientific learning with a focus on optics physics topics. The current study is creating a learning module consisting of optics physics activities for 4-H group leaders to direct their club members through. These activities need to have a guide that tells the group leader exactly what to do. Due to these group leaders not having a physics background, the activities must be easy to understand and consist of only basic physics terminology. In addition, these activities should align with the middle school curriculum and be effective at teaching the subject matter. Currently, we are testing activities and creating the guides to be put in the learning module. This research is important because 4-H has a large platform for distributing the module, which means this could reach all over and potentially affect many young children's desire to pursue physics and STEM professions in the future.

**Funding:** Federal (National Science Foundation)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

## Session IV (1:50-3:30 pm) – Physical Sciences & Engineering

### Poster #74

Methane Watchdog Network

**John Ruszkowski\***

*Department of Mechanical and Aerospace Engineering, West Virginia University, Morgantown, WV 26506*

**Field (Broad Category):** Engineering (Engineering)

**Student's Major:** Mechanical/Aerospace Engineering Dual Major

Though we would like to believe that our dependence on mining has been greatly diminished with the prevalence of new technologies such as recycling, the truth is that we still greatly depend on mining to get the resources for the things we need. To get these resources, miners risk their lives every day. One of the greatest threats to miners is methane. When mining, pockets of methane are often hit. If these pockets are large enough, the heat generated by the friction between the cutter head and the rock can ignite the methane, causing large explosions. It is important, then, to detect small amounts of methane in the rock before these large pockets are hit. Methane sensors purpose-built for mines work well, but they are often expensive, costing thousands of dollars. The question we asked ourselves was “how do we make methane safety more affordable for businesses?”. To accomplish this, the team has developed a “methane watchdog network”, incorporating several smaller, less expensive sensors, to operate with the same accuracy as an expensive sensor, but at a significantly lower cost. So far, the network is still being tested in the lab and has yet to be field tested in a mine. This article addresses the engineering design process for this unit, from conceptualization to building to the final product, and it also further explores the benefits of this system.

**Funding:** Private (The Alpha Foundation for the Improvement of Mine Safety and Health, Inc.)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #75**

Building An Arduino Weather Station

**Jada Williams\* and Katie Don**  
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**Field (Broad Category):** Engineering (Engineering)

**Student's Major:** pre-engineering

Building something can be confusing. One of the things that help ease this confusion is an Arduino. An Arduino is basically a microcontroller that can be used to compute many different things. In this project, it will be used to power a weather station and produce data on different parts of the weather that are calculated. These things include a temperature and humidity sensor to measure temperature and humidity, and an anemometer to measure the wind speed. The anemometer will be 3d printed. With these instruments combined with the present project will test the weather station where the Arduino would display the data on a computer. The data will be sent to the computer through the coding of the Arduino software. This Arduino software was made to help new engineers with building digital devices and other projects. It is one of the easiest to use and will be able to transfer the data of the temperature, humidity, and wind speed.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #76**

The Breakthrough of Rapid DNA Analysis

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**Field (Broad Category):** Forensics (Engineering)

**Student's Major:** Mechanical and Aerospace Engineering

Rapid DNA analysis, the ability for an untrained individual to produce a full forensic DNA profile in one hour or less using a single suitcase-sized instrument, has been made a reality in recent years. Rapid DNA analysis is being used in law enforcement applications as well as familial testing and border security. Currently, commercial rapid DNA systems are only validated for processing buccal swabs that almost always produce a full STR profile of an individual. However, the utility of these systems is such that they can be used for many other purposes such as disaster victim identification using tissue samples, as well as evaluating crime scene samples. The main goal of research in this field is to develop hardware and software techniques that will enable Rapid DNA systems to quickly and efficiently provide a full DNA profile on a wide range of sample types. The overall goal of the research being conducted in Dr. Dawson's Rapid DNA Analysis Lab is to expand the sample types that can be used by Rapid DNA systems using signal processing techniques often employed in the field of biometrics. The goal of the research I am conducting is to evaluate the performance of the RapidHIT-200 system when using DNA samples collected by a new forensic DNA collection device, the M-VAC system. This research will expand the application space of Rapid DNA systems, allowing them to be employed in a wider range of operational scenarios within DOJ, DHS, and DOD.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #77**

Temperature Ramp and Reaction Time Variances Affect Size and Chemistry of Manganese Oxide Nanoparticles

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**Field (Broad Category):** Nanoscience (Engineering)

**Student's Major:** Biomedical Engineering

Early detection of breast cancer is a necessity since research has shown that early discovery can boost 5-year survival rates to >95%. Manganese Oxide (MnO) nanoparticles are being investigated as an MRI contrast agent in breast cancer detection. MnO nanoparticles have exhibited pH sensitivity exploitable in cancer treatment. These nanoparticles remained intact in normal body pH of ~7.4 releasing no Mn<sup>2+</sup>. Nanoparticles were tested at pH ~6.5 with minimal Mn<sup>2+</sup> present in an environment mimicking tumor extracellular space. However, pH 5 was tested and this mimics pH of cellular endosomes and considerable Mn<sup>2+</sup> was released producing strong contrast after cellular uptake. MnO nanoparticles are synthesized by thermal decomposition in a heated, round bottom flask with these materials in solution: Mn (II) acetylacetonate (MnACAC), oleylamine to stabilize, and dibenzyl ether as an organic solvent. To promote size reduction, monodispersity, and spherical shape across nanoparticles, the lab has modified heating rate, time of reaction held at 300°C and ratios of starting materials. Smaller nanoparticle size helps the contrast agent through increased packing volume allowing more to be packaged into a polymer coating and promoting dissolution in pH 5 because of higher surface area to volume ratio. Smallest MnO cores were produced at faster temperature ramps with shortest reaction times at 300°C, but particle chemistry changed producing mixtures of MnO and Mn<sub>3</sub>O<sub>4</sub>. Pure MnO was produced by longer 300°C reaction times but slightly increasing particle size. Future experiments to add surface groups will be conducted to promote particle cellular uptake maximizing MRI contrast.

**Funding:** Institutional (WVU Startup Funds, Department of Chemical and Biomedical Engineering)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #78**

Analysis of Emissions of Bio-diesel Fuel Compared to Original Diesel Fuel

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**Field (Broad Category):** Other (Engineering)

**Student's Major:** Mechanical & Aerospace Engineering

When diesel engines burn fuel, they produce soot and gaseous emissions which can be harmful to the people of society and the environment. Bio-diesel, which is diesel fuel composed of animal fats and cooking oil, was tested to determine if bio-diesel burns cleaner than original diesel fuel. The main emissions that were studied were particulate matter and nitrogen oxides. It was found that the production of particulate matter and nitrogen oxides, were lower in the bio-diesel than the original diesel. The production of soot was measured by running the engine in different cycles in an engine testing laboratory. The particulate matter is drawn through the dilution tunnel and collected on a 47mm filter. The filter is weighed before testing. It is then conditioned and weighed after the test. This difference in mass is the amount of particulate matter collected. This test is key to creating alternatives to target the reduction of particulate matter and gaseous emissions created by diesel engines.

**Funding:** Institutional (West Virginia University)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Poster #79**

Broadening the Understanding of Selective Microwave Heating on the 1,2-Meisenheimer Rearrangement

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**Field (Broad Category):** Chemistry (Sciences)

**Student's Major:** Chemistry

Microwave reactors are common and safe devices that allow for the heating of reactions more rapidly and facilitate the use of solvents above their boiling points, in comparison with conventional heating. Some reactions carried out in microwave reactor, in comparison with heating conventionally, have microwave specific effects that are observed. These microwave specific effects can include faster rates of reactions and higher conversion yields when compared with the conventional heating method, and they are poorly understood. We hypothesize that in solutions containing a weakly absorbing solvent and a strongly microwave absorbing solute, that the microwave energy can selectively heat the solute. This selective heating of solutes is why microwave specific effects are hypothesized to occur. The reason this is not observed in conventional heating methods, hotplates or ovens, are that these methods heat systematically instead of through focused interactions with the solute. To test our hypothesis, a system utilizing the 1,2-Meisenheimer rearrangement of an amine N-oxide was developed. This system involves a weakly absorbing solvent (1,4-dioxane) and a much more polar solute (amine N-oxide). Upon heating the amine N-oxide rearranges into an alkoxy amine which is less polar than the starting amine N-oxide; this change in polarity potentially allows for selective heating of N-oxide. This system will allow us to compare conventional heating versus microwave heating and help improve our understanding of microwave heating. We expect to find that the reaction rate of the rearrangement is accelerated in the microwave system compared to the conventionally heated system.

**Funding:** Institutional (National Science Foundation and West Virginia University)

**Program/mechanism supporting research/creative efforts:**

a WVU 497-level course

**Poster #80**

Mock Vandalism: A Study of the Transfer and Persistence of Glass, Paint, and Plastic

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**Field (Broad Category):** Forensics (Sciences)

**Student's Major:** Forensic and Investigative Science

The studies of transfer and persistence of evidence as well as the random occurrence in the general population, are key for the forensic comparison and interpretation of evidence at a scene. In this study, a mock vandalism case was designed as part of WVU's Trace Evidence course, to evaluate how different types of evidence including paint, glass, and plastic will transfer, and to what extent they persist through various activities. Prior to the breaking events, background samples were collected from those participating to provide a control group. During the vandalism, the first individual created a graffiti with spray paint on the windshield of the victim's vehicle, then broke the windshield with a crowbar. The second individual broke the right headlight and hit the hood with a bat. One suspect attempted to flee the scene while the other was arrested at the site. After the scenario concluded, evidence was collected from those involved, the exterior of the vandalized vehicle, and the interior of the police vehicle. The glass recovered from the broken headlight was subject to fracture matching examination to determine if known and unknown samples fit back together. Residues of glass and paint from the scene, clothing and cars were processed at the laboratory to identify their main physical, optical and chemical composition. This mock crime scene illustrated the value of trace evidence in the reconstruction of events, providing leading information during the investigation and assessing the value of evidence presented in court.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #81**

Forensic Footwear Examinations: What Factors Affect an Examiner's Accuracy?

**Tabitha DeBat,\* Nicole Richetelli, and Jacqueline Speir***Department of Forensic and Investigative Science, West Virginia University, Morgantown, WV 26506***Field (Broad Category):** Forensics (Sciences)**Student's Major:** Forensic and Investigative Science

A major goal of forensic footwear examinations is to assess the association between questioned crime-scene impressions and known suspects' shoes. This assessment requires an examiner to evaluate the similarity and dissimilarity of a multitude of characteristics, including outsole design and size, the degree and type of wear, and the presence of what are termed randomly acquired characteristics (RACs), such as nicks and tears that develop on outsoles through use. When formulating an opinion about the degree of similarity or dissimilarity between impressions the forensic expert decision-maker relies on a complex host of external (case) and internal (examiner) factors, such as the quality of the questioned impression and the analyst's experience. The purpose of this study was to evaluate if accuracy in examiner conclusions varies as a function of certain case and examiner attributes; namely, conclusion scale type, examiner certification and overall case difficulty. In order to evaluate if accuracy is influenced by the aforementioned attributes, 12 mock cases, varying in media, substrate and enhancement method were evaluated by 77 examiners, and their conclusions were analyzed using the chi-square test of independence. The tests failed to detect dependence for the variables of conclusion scale and examiner certification, however, individual case was shown to be dependent. These results indicate that conclusion scale and examiner certification does not significantly impact the accuracy of conclusions. Rather, it is specific case factors that have a larger influence on performance.

**Funding:** Federal (National Institute of Justice)**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) &amp; accompanying HONR 297-level course

**Poster #82**

Evaluation of Extraction Techniques for Fentanyl and Metabolites in Liver Tissue for Forensic Purposes

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**Field (Broad Category):** Forensics (Sciences)

**Student's Major:** Forensics

In a forensic toxicology laboratory, the analysis of biological samples is conducted with the primary goal to determine the presence or absence of drugs of abuse to help identify cause of death. One of the most important specimen for analysis is liver tissue. This is because the liver provides drug metabolic information that help to determine the kind of drugs that might have been used. The analytical protocol for extraction of these drugs on a complex matrix, such as liver, requires the utilization of extractions techniques like liquid-liquid extractions (LLE) or solid-phase extraction (SPE). However, the incorporation of modern extraction techniques like QuEChERS (quick, easy, cheap, effective, rugged, and safe) introduces a way to reduce typical interferences including salts, fatty materials, and other matrix components. In this study, a comprehensive assessment of the extraction capabilities of LLE, SPE, and QuEChERS was performed on liver tissues enriched with fentanyl and the two main metabolites norfentanyl and despropionyl fentanyl (4-ANPP). For all three extractions, a sample of 0.2 g liver tissue was homogenized by using a high-speed mixer mill. SPE was performed using Bond Elut Certify 130 mg/3 mL columns. LLE performed under basic (pH > 7) conditions using methyl tert-butyl ether (MTBE). The QuEChERS was performed with 0.2 g QuEChERS salts, acetonitrile, and dispersive-SPE tubes. Of the types of extractions, results were evaluated based on matrix effects, recovery, and process efficiency with QuEChERS performing superior to LLE and SPE. Overall, QuEChERS displayed an improved overall extraction compared to LLE and SPE.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #83**

Spin-Selective Energy Level Modification via the AC Stark Effect in a Quantum Dot

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**Field (Broad Category):** Physics & Astronomy (Sciences)

**Student's Major:** Physics

This project was created with the idea of creating faster ways to manipulate and measure an electron trapped in a quantum dot. This electron can be considered a qubit, or quantum bit, where its spin represents zero or one as in a conventional bit. A problem with this approach to creating quantum bits is manipulating and measuring the spin of the electron can be tricky. The process of manipulation and measurement use applied magnetic fields to the quantum dot sample, where each operation requires a field orthogonal to the previous. Changing the direction of propagation of the magnetic field takes minutes, which is problematic in a quantum mechanical environment. Our method takes on the order of nanoseconds, where we quickly apply a laser directly to the sample, shifting its energy levels in a similar way to a magnetic field. This shift is spin-selective, where depending on the polarization of our laser, a different electron energy state is shifted. In our analysis we've noticed that in applying a spin selective shift, an unwanted shift occurs. This is currently being attributed to dynamic nuclear polarization, where the spin of the nuclei of the atoms around the electron affect its energy state. In summation, when applying a spin-selective AC Stark shift to a charged quantum dot, we see unexpected shifts in the energy states of the bound electron, though this method still holds much potential for future operations on quantum bits.

**Funding:** State (West Virginia Space Grant Consortium)

**Program/mechanism supporting research/creative efforts:**

My efforts were mainly voluntary.

**Poster #84**

Carbon Recombination Lines in Galactic HII Regions

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**Field (Broad Category):** Physics & Astronomy (Sciences)

**Student's Major:** Geology

HII regions are formed by a massive (many masses more than our Sun) star(s) ionizing the gas orbiting around it. As electrons are stripped from their host atoms, they become positive charges and the gas begins to heat up and radiate energy. HII regions are mostly hydrogen, but also contain heavier elements such as carbon, oxygen, and helium. These heavier elements suggest a more active and older HII region. I have been looking at the carbon recombination lines of these objects which I detect as a radio burst when electrons recombine with the ionized atoms. In HII regions the hydrogen tends to be found closest to the star while the heavier elements like carbon and oxygen are found farther out. HII regions are the primary building block of massive star-forming regions in galaxies. These massive star-forming regions release large amounts of heavy elements and energy into the cosmos. Mapping and understanding these regions are key to understanding galaxy formation, evolution and even our place in the Universe.

**Funding:** Federal (NASA, West Virginia Space Grant Consortium)

**Program/mechanism supporting research/creative efforts:**

My efforts were mainly voluntary.

**Poster #85**

Time Dependence of Pulsars Nulling Fraction

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**Field (Broad Category):** Physics & Astronomy (Sciences)

**Student's Major:** Aerospace Engineering

The emissions from radio pulsars have variability in timescale range from as little as a fraction of a second to decades. The evolution of the variability is not yet fully understood. All past studies involving characterizing nulling pulsars by their nulling fraction have only used several observations, usually similar in date. To allow for a more decisive conclusion we propose calculating the nulling fraction of all observations of nulling pulsars from the Parkes radio telescope from 1999-2006. In doing so this study hopes to accomplish the following two objectives. First, the current study hopes to further the understanding of the emission machine of these energetic, high magnetic field objects. By studying the nulling fraction as a function of time we expect to find that the process is random thus, confirming prior predictions. If the process is found to be periodic further work will be needed for a conclusion. Secondly, the current study hopes to develop a database of pulsars nulling fractions of select pulsars over time.

**Funding:** Other (NANOGRAV)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #86**

Molecular Beam Epitaxy of Hexaboride Thin Films Enabled by the Reaction  $B_2H_6 + M$  ( $M = Ca, Sr, Ba$  and Lanthanides)

**Michael Howell, Ethan Floyd and Yanjun Ma**

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**Field (Broad Category):** Physics & Astronomy (Sciences)

**Student's Major:** Physics

The successful development of semiconducting thin films with superior qualities by molecular beam epitaxy (MBE) technique has revolutionized electronic industries and offered modern technologies such as smartphones and personal computers. The elucidation of exotic quantum properties discovered in novel materials will advance science and technologies to the next generation. Recently, the hexaboride materials  $MB_6$  ( $M = Ca, Sr, Ba$  and lanthanides) have emerged as a family of quantum materials including magnetism, superconductivity, strong correlation and topological physics. The investigation on such materials, however, has been impeded by the lack of high-quality hexaboride thin films. Here at West Virginia University, we are setting up an MBE facility to investigate the synthesis of hexaboride thin films by exploiting the reaction between diborane gas  $B_2H_6$  and metals from alkaline earth group ( $Ca, Sr$  and  $Ba$ ) and lanthanides. The apparatus has been first designed by 3D modeling software (such as AutoCAD and SolidWorks) and manually built step-by-step. Similar approaches have been utilized to produce superconducting  $MgB_2$  thin films but has never been implemented on hexaborides. The success of this work will deliver 1) a new synthesis method for generating  $MB_6$  materials and 2) thin films of hexaborides that allow the properties of  $MB_6$  to be tuned by heterostructuring, external strain, dimensional confinement and interface engineering.

**Funding:** Other

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Poster #87**

Magnetic Properties in Thin Films

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**Field (Broad Category):** Physics & Astronomy (Sciences)

**Student's Major:** Physics

Magnets are commonplace within a household (particularly on the refrigerator), yet few understand the breadth and complexity that magnets can have. There is a limit to the amount of magnetization a material can have, which is known as its maximum magnetic saturation. Even when the applied magnetic field is turned off, a ferromagnetic material retains some of its magnetization. Then if the applied field is reversed, the material gets a similar magnetization effect, but in the opposite direction. A graph of this process of measuring the magnetization with the applied magnetic field is called a hysteresis loop. Particularly today when devices are routinely being shrunk, the thickness of the material that is being magnetized plays a huge part in its magnetization limits. The purpose of my research is to collect information on the magnetization of specific thin materials in order to build a large enough database to feed to machine learning algorithms to recognize patterns and predict the magnetization of related materials. The long term goal is to use such algorithms to optimize material properties and suggest new interesting directions.

**Funding:** Institutional (NASA West Virginia Space Grant Consortium)

**Program/mechanism supporting research/creative efforts:**

Other

NASA West Virginia Space Grant Consortium

**Poster #88**

Exploring Post-merger SMBH Evolution

**Kristin Wolfe,\* Sarah Spolaor, Peter Breiding, Rodney Elliot,\* Joseph Lazio, Gregory Walsh, and Caitlin Witt**

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**Field (Broad Category):** Physics & Astronomy (Sciences)

**Student's Major:** International Studies

Radio imaging is fast becoming a leading method to discover and vet dual and binary supermassive black hole (SMBH) candidates. Despite significant scientific interest in post-merger double SMBH systems, the  $\mu\text{Jy}$  sensitivity needed to reliably assess some candidates have hindered the possibility of large-scale efforts to successfully identify these sources. We propose multi-frequency VLBA observations as part of the VLBA Filler Project Challenge, in a comprehensive effort to:

- Provide compelling evidence for (or reject the presence of) any genuine dual, binary, or recoiling SMBH in our target sample of candidate systems;
- Examine SMBH and active nucleus evolution during merger by measuring parsec-scale radio morphologies in candidate post-merger systems;
- Directly measure the efficiency of SMBH centralization by seeking evidence of double nuclei over seven orders of spatial scale, down to the sub-parsec separations detectable by pulsar timing array experiments.

While our ultimate aim is to discover and provide conclusive evidence of double active galactic nuclei (AGN), our project's rich data set will confidently address all of the above goals. Our targets are well-distributed throughout the sky and are not in the Galactic plane.

**Funding:** Federal (NSF)

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #89**

Exploring Possible Connections Between Short Gamma-Ray Burst Remnants and Fast Radio Bursts

**Olivia R. Young,\* Dr. Maura McLaughlin, Dr. Dustin Madison, Devansh Agarwal, and Kshitij Aggarwal**

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**Field (Broad Category):** Physics & Astronomy (Sciences)

**Student's Major:** Physics

Fast Radio Burst (FRBs) are bursts of radio waves that come from outside of our galaxy, and last for only a few milliseconds, yet have as much power as a month of our sun burning. However, Astronomers are still unsure of their origins. The purpose of this project is to explore possible connections between FRBs and Gamma-Ray Bursts (GRBs). GRBs are extra-galactic bursts of gamma waves that are the result of a black hole binary system collision or a binary system between a neutron star and black hole colliding. Using the Green Bank Telescope and the Arecibo Telescope, ten hours of data observing the sky locations of GRBs were taken. These observations make up thirteen terabytes of data that must be processed and searched through. In order to expedite this processes, Machine Learning will be employed to search through the data for FRBs. Machine Learning is quickly becoming an invaluable tool in the scientific realm, with far reaching applications both in this project and beyond. If there are no FRBs found in the data, upper limits will be set on the probability of a FRB/GRB connection, however, if an FRB is found, this discovery will revolutionize the field of FRB Astronomy.

**Funding:** Federal (NSF)

**Program/mechanism supporting research/creative efforts:**

My efforts were mainly voluntary.

**Poster #90**

Affordable Cybersecurity Education Using Cloud Resources

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**Field (Broad Category):** Computer Science (Technology)

**Student's Major:** Computer Science

School systems in the United States and across the world generally do not have the funding necessary to study cybersecurity. With the field on the rise, and more employees being needed to fill the gaps in the workforce, cybersecurity training is becoming more necessary. Without having the funding to set up effective physical machines to practice on, the only affordable solution is virtualization. The Cyber Sandbox Software Portal (CSSP) allows those with limited resources to deploy and maintain their own cybersecurity training environments. With this application, cybersecurity training is made more widely available, allowing people to fill the abundance of jobs. The application utilizes the Amazon Web Services Elastic Compute Cloud to grant instances to individual users for training environments. It uses the AWS Ruby API to accomplish the management of the service. The virtualization makes it possible to easily and quickly reset the machine to its original state, cutting the cost and hassle out of resetting and maintaining physical hardware.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:**

WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Poster #91**

Zero-Net Solar Powered Charging System for Electric Vehicles

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**Field (Broad Category):** Mechanical Engineering (Engineering)

**Student's Major:** Mechanical and Aerospace Engineering

This report summarizes the technical construction of a zero-net solar charging ecosystem for an electric vehicle and construction a scale vehicle to be powered by the solar ecosystem. The goal of the project is to provide a design for individuals to replicate. The design in this report allows for anyone who wishes to own an electric vehicle, and source the power ethically from renewable solar energy, to do so. With more people searching for ways to combine clean energy and transportation, this report seeks to aid them and thus, create a cleaner future. The main parameters reviewed for the scale vehicle include battery technology, storage capacity, charging time, and operating range. The solar ecosystem parameters will consist of panel selection, battery technology, and inverter technology. The proposed solar power electric vehicle charging system consists of a solar cell, solar inverter, storage battery, and charging plug. The capacity of the storage battery was designed to provide the electricity for a user to run an electric vehicle for two days. The entire ecosystem is built on a scale model and can be scaled to any electric vehicle. This design will consider a DC electric motorcycle for calculation sake. The cost of the system was estimated using components available in the spring of 2019. Savings will be calculated based on local Morgantown, WV electricity prices.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course