18th Annual

UNDERGRADUATE RESEARCH DAY

at the Capitol

3.5.2021

WEST VIRGINIA STATE UNIVERSITY

MARSHALL

West Virginia Science & Research

WestVirginiaUniversity.

UC University of Charleston

PARTICIPANTS BY HOUSE DISTRICT (first authors only as provided by participants)

House #	Participant		Presentation #
2	Linda	Ma	58
3	Evan	Allen	39
	Ashley	Linder	32
	Melina	McCabe	40
	Alyssa	Settle	71
4	Abreanne	Andlinger	56
	Anthony	Siler	70
6	Gannon	Cole	62
	Jacqueline	Brown	45
7	Ryan	McFarland	66
8	Rhett	White	54
10	Ivie	Minney	25
	Rachel	Minney	28
13	Christopher	Bias	30
	Brent	Sutaut	61
14	Tate	Hawkins	64
	Heather	Connery	74
15	Devin	Danford	24
	Andrew	Wall	34
16	Yousef	Adelgaber	65
17	Amartya	Das	19
	William	Coleman	35
	Samuel	Temesgen	36
20	Austin	Davis	29
25	Syed	Ali	8
	Alysia	Inosencio	77
26	Nadia	Johnson	82
27	Dakota	Parnell	21
	Sydney	Philpott	73
	Hayden	Woyan	69
30	Hailey	Brooks	6
	Ryan	Vaught	12
	Allison	Ball	42
32	Jacob	Slate	15
	Madison	Lilly	50
	Mackenzie	Miller	55
33	Darren	Ray	67
34	Logan	Rose	52
35	Christopher	Bowden	78

	Shan	Esmer	68
	Hannah	Hudson	7
	Emily	Thomas	63
	Sean	Woody	31
36	Olivia	Lim	26
	Abigail	Williams	18
37	Maria	Irfan	13
	Catherine	Morris	14
38	Zachary	Matheny	23
42	Jaelynn	Parks	9
44	Cameron	Prater	33
	Brooklyn	Butcher	6
43	Lindsey	Hartzell	66
48	Samantha	Holbert	72
	Jonathan	Lipovich	17
	Kiersten	Lowdermilk	45
	Olivia	Oldaker	59
50	Peydan	McVicker	27
51	Kamil	Abbas	38
	Kailey	Basham	76
	Emmelia	Braun	10
	Kelcie	Britton	3
	Riley	Kane	2
	Wren	King	81
	Sara	Kuberski	44
	Bennington	Opdahl	47
	Portia	Peterson	53
	Hannah	Petronek	17
	Sophia	Shank	79
	Vignesh	Sivashankar	1
	Annette	Straziuso	60
	Ram	Zaveri	37
52	Claire	Kelly	49
53	Christopher	Anderson	41
54	Sierra	Arbaugh	21
55	Zackary	Laney	43
56	Hosanna	Barrett	5
59	Devin	Kelly	4
	Jessica	Hogbin	48
62	Daniel	Price	46

63	Brandon	Dolly	80

II. PARTICIPANTS BY SENATE DISTRICT (first authors only as provided by participants)

Senate #	Participant		Presentation #
1	Ashley	Linder	32
	Melina	McCabe	40
2	Kamil	Abbas	38
	Abreanne	Andlinger	56
	Riley	Kane	2
	Sara	Kuberski	44
	Linda	Ma	58
	Bennington	Opdahl	47
	Sara	Kuberski	68
	Petdab	McVicker	27
	Anthony	Siler	70
3	Gannon	Cole	62
	Ryan	McFarland	66
	Ivie	Minney	28
	Rachel	Minney	25
4	Heather	Connery	74
	Devin	Danford	24
	Tate	Hawkins	64
	Andrew	Wall	34
5	Yousef	Abdelgaber	65
	William	Coleman	35
6	Syed	Ali	8
	Evan	Allen	39
	Austin	Davis	29
	Alysia	Inosencio	77
	Nadia	Johnson	82
	Dakota	Parnell	20
	Sydney	Philpott	72
	Hayden	Woyan	69
7	Alyssa	Settle	71
8	Christopher	Bias	30
	Hannah	Hudson	7
	Maria	Irfan	13
	Zachary	Matheny	23
	Sean	Woody	31

9	Allison	Ball	42
	Hailey	Brooks	6
	Ryan	Vaught	12
10	Madison	Lilly	50
	Mackenzie	Miller	55
	Jaelynn	Parks	9
	Jacob	Slate	15
11	Sierra	Arbaugh	21
	Zackary	Laney	43
	Cameron	Prater	33
12	Samantha	Holbert	72
	Jonathan	Lipovich	17
	Kiersten	Lowdermilk	45
	Olivia	Oldaker	59
	Darren	Ray	67
	Logan	Rose	52
13	Kailey	Basham	76
	Emily	Braun	10
	Kelcie	Britton	3
	Wren	King	81
	Portia	Peterson	53
	Hannah	Petronek	16
	Sophia	Shank	79
	Vignesh	Sivashankar	1
	Annette	Straziuso	60
	Ram	Zaveri	37
	Brent	Zutaut	61
14	Christopher	Anderson	41
	Claire	Kelly	49
15	Hosanna	Barrett	5
	Devin	Kelly	4
	Jessica	Hogbin	48
	Daniel	Price	46
16	Brandon	Dolly	80
17	Christopher	Bowden	78
	Amartya	Das	19
	Shan	Esmer	68
	Olivia	Lim	26
	Catherine	Morris	14
	Samuel	Temesgen	36
	Emily	Thomas	63

Rhett	White	54
Abigail	William	18

III. OUT-OF-STATE PARTICIPANTS (first authors only as provided by participants)

State/Country	Participant		Presentation #
DE	Michelle	Coleman	57
PA	Rylee	Cisney	51
	Kelsey	Keen	75
TX	Marissa	Gibides	22
VA	Cedric	Drennen	11

IV. PARTICIPANTS BY FIELD (first authors only)

Biochemistry			Presentation #
	Vignesh	Sivashankar	1
	Riley	Kane	2
	Kelcie	Britton	3
	Devin	Kelly	4
Biology			Presentation #
	Hosanna	Barrett	5
	Hailey	Brooks	6
	Hannah	Hudson	7
	Syed	Ali	8
	Jaelynn	Parks	9
	Emmelia	Braun	10
	Cedric	Drennen	11
	Ryan	Vaught	12
	Maria	Irfan	13
	Catherine	Morris	14
	Jacob	Slate	15
	Hannah	Petronek	16
	Jonathan	Lipovich	17
	Abigail	Williams	18
	Amartya	Das	19
	Dakota	Parnell	20
Biomedical			Presentation #
	Sierra	Arbaugh	21
	Marissa	Gibides	22
	Zachary	Matheny	23
Chemistry			Presentation #
	Devin	Danford	24
	Rachel	Minney	25
	Olivia	Lim	26
	Peydan	McVicker	27
	Ivie	Minney	28
	Austin	Davis	29

Christopher	Bias	30
Communications/Journalism		Presentation #
Sean	Woody	31
Community Health		Presentation #
Ashley	Linder	32
Computer Science		Presentation #
Cameron	Prater	33
Andrew	Wall	34
William	Coleman	35
Samuel	Temesgen	36
Ram	Zaveri	37
Education		Presentation #
Kamil	Abbas	38
Engineering		Presentation #
Evan	Allen	39
Melina	McCabe	40
Christopher	Anderson	41
English		Presentation #
Allison	Ball	42
Environmental Studies		Presentation #
Zackary	Laney	43
Forensic Science		Presentation #
Sara	Kuberski	44
Kiersten	Lowdermilk	45
Geology		Presentation #
Daniel	Price	46
Geoscience		Presentation #
Bennington	Opdahl	47
History		Presentation #
Jessica	Hogbin	48
Immunology and Medical Micobiology		Presentation #
Claire	Kelly	49
Madison	Lilly	50
Rylee	Cisney	51
Mathematics		Presentation #
Logan	Rose	52
Native American Studies		Presentation #
Portia	Peterson	53
Neuroscience		Presentation #
Rhett	White	54
Mackenzie	Miller	55
Abreanne	Andlinger	56
Michelle	Coleman	57
Linda	Ma	58
Other		Presentation #
Olivia	Oldaker	59

Annette	Straziuso	60
Brent	Zutaut	61
Gannon	Cole	62
Emily	Thomas	63
Physics		Presentation #
Tate	Hawkins	64
Yousef	Abdelgaber	65
Political Science		Presentation #
Ryan	McFarland	66
Darren	Ray	67
Shan	Esmer	68
Psychology		Presentation #
Hayden	Woyan	69
Anthony	Siler	70
Alyssa	Settle	71
Samantha	Holbert	72
Sydney	Philpott	73
Heather	Connery	74
Kelsey	Keen	75
Kailey	Basham	76
Alysia	Inosencio	77
Christopher	Bowden	78
Sophia	Shank	79
Brandon	Dolly	80
Sociology/Social Work		Presentation #
Wren	King	81
Nadia	Johnson	82

V. PARTICIPANTS BY BROAD CATEGORY (first authors only)

Education		Presentation #
Brandon	Dolly	80
Engineering		Presentation #
Samual	Temesgen	36
Evan	Allen	39
Melina	McCabe	40
Christopher	Anderson	41
Annette	Straziuso	60
Yousef	Abdelgaber	65
Health Sciences		Presentation #
Riley	Kane	2
Hailey	Brooks	6
Jaelynn	Parks	9
Sierra	Arbaugh	21
Marissa	Gibides	22
Zachary	Matheny	23

Ashley	Linder	32
Kamil	Abbas	38
Claire	Kelly	49
Rylee	Cisney	51
Rhett	White	54
Mackenzie	Miller	55
Michelle	Coleman	57
Linda	Ma	58
Olivia	Oldaker	59
Anthony	Siler	69
Sydney	Philpott	72

Humanities		Presentation #
Allison	Ball	42
Jessica	Hogbin	48
Portia	Peterson	53

Sciences		Presentation #
Kelcie	Britton	3
Devin	Kellly	4
Hosanna	Barrett	5
Hannah	Hudson	7
Syed	Ali	8
Emmelia	Braun	10
Cedric	Drennen	11
Ryan	Vaught	12
Maria	Irfan	13
Catherine	Morris	14
Jacob	Slate	15
Hannah	Petronek	16
Jonathan	Lipovich	17
Abigail	Williams	18
Amartya	Das	19
Dakota	Parnell	20
Devin	Danford	24
Rachel	Minney	25
Olivia	Lim	26
Peydan	McVicker	27
Ivie	Minney	28
Austin	Davis	29
Christopher	Bias	30
Ram	Zaveri	37
Zackary	Laney	43
Sara	Kuberski	44
Kiersten	Lowdermilk	45
Daniel	Price	46
Bennington	Opdahl	47
Madison	Lillly	50

Logan	Rose	52
Abreanne	Andlinger	56
Brent	Zutaut	61
Gannon	Cole	62
Emily	Thomas	63
Tate	Hawkins	64

Social Sciences		Presentation #
Ryan	McFarland	66
Darren	Ray	67
Shan	Esmer	68
Hayden	Woyan	69
Alyssa	Settle	71
Samantha	Holbert	72
Heather	Connery	74
Kelsey	Keen	75
Kailey	Basham	76
Alysia	Inosencio	77
Christopher	Bowden	78
Sophia	Shank	79
Wren	King	81
Nadia	Johnson	82

Technology		Presentation #
Vignesh	Sivashankar	1
Sean	Woody	31
Cameron	Prater	33
Andrew	Wall	34
William	Coleman	35

VI. PARTICIPANTS BY INSTITUTION (first authors only)

Bluefield State College		Presentation #
Syed	Ali	8
Dakota	Parnell	20

Concord University		Presentation #
Cedric	Drennen	11
Alysia	Inosencio	77
Nadia	Johnson	82
Sydney	Philpott	73
Hayden	Woyan	69

Fairmont State University		Presentation #
Peydan	McVicker	27
Kiersten	Lowdermilk	45

Marshall University		Presentation #
Yousef	Abdelgaber	65
Evan	Allen	39
William	Coleman	35

Cameron	Prater	33
Logan	Rose	52
Ryan	Vaught	12
Andrew	Wall	34
Shepherd University		Presentation #
Brandon	Dolly	80
University of Charleston		Presentation #
Christopher	Bowden	78
Heather	Connery	74
Austin	Davis	29
Shan	Esmer	68
Zackary	Laney	43
Ryan	McFarland	66
Catherine	Morris	14
Darren	Ray	67
Alyssa	Settle	71
Jacob	Slate	15
Emily	Thomas	63
Abigail	Williams	18
Sean	Woody	31
West Virginia State University		Presentation #
Christopher	Bias	30
Gannon	Cole	62
Devin	Danford	24
Amartya	Das	19
Hannah	Hudson	7
Maria	Irfan	13
Olivia	Lim	26
Zachary	Matheny	23
Ivie	Minney	28
Rachel	Minney	25
Samual	Temesgen	36
West Virginia University		Presentation #
Kamil	Abbas	38
Christopher	Anderson	41
Abreanne	Andlinger	56
Sierra	Arbaugh	21
Allison	Ball	42
Hosanna	Barrett	5
Kailey	Basham	76
Emmelia	Braun	10
Kelcie	Britton	3
Rylee	Cisney	51
Michelle	Coleman	57
Marissa	Gibides	22
Tate	Hawkins	64

Jessica	Hogbin	48
Samantha	Holbert	72
Riley	Kane	2
Kelsey	Keen	75
Claire	Kelly	49
Devin	Kelly	4
Wren	King	81
Sara	Kuberski	44
Ashley	Linder	32
Jonathan	Lipovich	17
Linda	Ma	58
Melina	McCabe	40
Olivia	Oldaker	59
Bennington	Opdahl	47
Portia	Peterson	53
Hannah	Petronek	16
Daniel	Price	46
Sophia	Shank	79
Anthony	Siler	70
Vignesh	Sivashankar	1
Annette	Straziuso	60
Rhett	White	54
Ram	Zaveri	37
Brent	Zutaut	61

West Virginia University Institute of Technology		Presentation #
Hailey	Brooks	6
Madison	Lilly	50
Mackenzie	Miller	55
Jaelynn	Parks	9

1. Bioprinter Construction Using an Open-Source 3-D printer

Vignesh Sivashankar (Morgantown, West Virginia)

Institution: West Virginia University
Field: Technology (Biochemistry)
Faculty Advisor: Mark Tseytlin

A 3-D bioprinter can fabricate biological tissues and organs from a substrate, bio-ink. Tissues printed by bioprinters are used for research and drug discovery, removing the need for conducting in vivo experiments. In the future, bio-engineered organs are expected to fill the need for organ transplants. The bioprinter being built in this project will be used for imaging the chemical microenvironment in tissue constructs. Commercially available bioprinters are very expensive and are not versatile enough to handle these requirements. This research aims to design a bioprinter by modifying an open-source extruder 3-D printer. The open-source nature of the printer allows for unlimited freedom in the modification of the bio-inks, introductions of imaging agents, and cross-linking strategies. The plastic extruder was replaced with a linear actuator and a syringe that would hold and release the bio-ink. The firmware of the 3-D printer was programmed to control the movement and extrusion of the syringe. Several trials were performed using chemically crosslinked bioinks like alginate and photopolymerized bioinks like gelatin methacryloyl. The printed models were imaged using a functional electron paramagnetic resonance imaging system to confirm the ability of printing models from bioink and thereby demonstrate its capability of meeting the requirements of a bioprinter.

Funding: National Institutes of Health, R01 EB023888

2. Novel Compound Screening to Combat Huntingtin Protein Aggregation in a Transgenic C. elegans Model.

Riley Kane (Morgantown, West Virginia)

Institution: West Virginia University
Field: Health Sciences (Biochemistry)
Faculty Advisor: Werner Geldenhuys

Huntington's Disease (HD) is a progressive, neurodegenerative disorder currently affecting nearly 30,000 people in the United States, while another 200,000 are genetically predisposed to disease development. The average age of onset is around 30-50 years of age, with patients presenting clinical symptoms that include cognitive impairment, uncontrollable movements (chorea), behavioral disturbances, and dementia. Hallmark pathology of HD includes aggregation of the huntingtin protein (Htt) due to increased polyglutamine repeats. In HD, Htt proteins aggregate within the striatum, substantia nigra, varying layers of the cerebral cortex, hippocampus, cerebellum, and parts of the hypothalamus and thalamus. Htt aggregation increases brain oxidative stress, thus killing neurons and progressing the disease. While there is no cure for HD, this study aims to screen novel compounds using a transgenic *Caenorhabditis elegans* model of HD that expresses various lengths of the Htt protein, examining the effects of our compounds on lifespan, Htt aggregation, and neuronal death.

Funding: National Institute of Health

3. Analysis of Esterase Genes Involved in Synthesis of Pharmaceutically important Ergot Alkaloids in Fungi

Kelcie Britton (Morgantown, West Virginia)

Institution: West Virginia University
Field: Sciences (Biochemistry)
Faculty Advisor: Daniel Panaccioine

Ergot alkaloids are lysergic acid containing compounds produced by several species of fungi that have been associated with significant human and animal toxicoses. Despite their toxicity, modified and appropriately dosed ergot alkaloid derivatives are effective pharmaceutical treatments for dementia, migraines, and hyperprolactinemia. Biochemical pathways to some ergot alkaloids have been studied, but critical steps in the synthesis of lysergic acid amides remain elusive. These gaps are significant because many of the pharmaceutically relevant ergot alkaloids are derived from lysergic acid amides. Lysergic acid α-hydroxyethylamide (LAH) is the main ergot alkaloid produced by the fungus *Metarhizium brunneum*. We hypothesize two genes, named *easP* and *estA,* encode esterases involved in the final step of LAH biosynthesis. To test this hypothesis, CRISPR mutants were engineered in a *M. brunneum* background with *easP* alone mutated and with both *estA* and *easP* mutated. Biochemical analysis of our mutant strains demonstrated the product of *easP* has a significant effect on the production of LAH; the *easP* mutant only accumulated half of the LAH measured in non-mutant strains. The quantity of LAH in strains was normalized relative to fungal biomass as estimated, by measuring the fungal metabolite ergosterol, using liquid chromatography-mass spectrometry. The double mutant has been prepared, and the effects on ergot alkaloids will be measured in ongoing experiments. The hypothesized activity of EasP as an esterase is being tested by expressing the protein in *E. coli*. The phenotype of our CRISPR mutant demonstrates that *easP* is an integral part of the pathway to LAH.

Funding: The Arnold and Mabel Beckman Foundation and the National Institute of General Medical Sciences

4. Analysis of Active Site Mutation in Casein Kinase 2 Involved in Okur-Chung's Neuropathy

Devin Kelly (Hedgesville, West Virginia)

Institution: West Virginia University
Field: Sciences (Biochemistry)
Faculty Advisor: Ashok Bidwai

Okur-Chung's neuropathy is a human neurodevelopmental disorder characterized by mental disabilities and dysmorphic facial features. Recent studies have led to discovery of ten distinct mutations in the human *CSNK2A1* gene, which encodes the alpha subunit of the enzyme Casein Kinase 2 (CK2), that cause the onset of Okur-Chung's neuropathy. CK2 is a highly conserved, ubiquitous protein kinase that plays a role in a wide variety of cellular functions. The means by which each of the ten known mutations leads to the onset of disease is unknown, and to develop potential treatments for this disease, the molecular mechanisms of each mutated CK2 alpha subunit must be analyzed. The mutation of isoleucine (Ile) at position 174 to methionine (Met) is of particular interest, as this mutation occurs in close proximity to the active site of the enzyme, where the binding of Mg^{2+}-ATP enables donation of a phosphate group to activate CK2 for phosphorylation of substrates. Furthermore, Ile174 appears to be 100% conserved in all isoforms, indicating the importance and selectivity of this residue. It is proposed that the mutation of Ile174 to methionine should impair the function of CK2 due to changes in steric interactions, orientation, and available space within the active site. Due to the location of the mutation in the active site, interaction with binding partners like the regulatory beta subunits of CK2 should not be affected, while interactions with substrates that typically bind to the active site may be impaired. This hypothesis will be tested using yeast complementation assays in which mutated animal CK2 alpha will attempt to rescue yeast that have lost their own CK2 isoforms. Interactions between CK2 alpha, substrates, and binding partners will be assessed for the mutant enzyme through two-hybrid analyses (Gal4 fusions) in yeast cells.

Funding:

5. Conoideocrella luteorostrata, a Potential Fungal Biocontrol of the Invasive Christmas Tree Pest Elongate Hemlock Scale

Hosanna Barrett (Keyser, WV)

Institution: West Virginia University
Field: Sciences (Biology)
Faculty Advisor: Matthew Kasson

Elongate hemlock scale (*Fiorinia externa*) is a small scale insect that infests the needles of hemlock and fir trees. It is native to eastern Asia but has been introduced into the northeastern United States over a century ago. Infested trees develop a high concentration of scales on the underside of needles. When severe, infestations can weaken trees and also reduces their ability to be transported or sold. Scale populations are currently managed using pesticides, but these interventions do not always have the desired effect of reduced populations. Pesticides can result in the population of elongate hemlock scale increasing in the long term, due to a reduction in the population of its natural enemies that are susceptible to the same pesticides. The goal of this project is to investigate natural fungal pathogens of elongate hemlock scale insects in the eastern U.S. for development into biocontrol agents. In the Summer of 2020, Fraser fir branches with heavy elongate hemlock scale infestations were collected and scales were examined for signs of fungal infection. Both fungi outwardly infecting scale crawlers and fungi comprising the needle microbiome were isolated, in order to characterize fungal diversity and ecological interactions. The principal fungus infecting the scales was molecularly identified as *Conoideocrella luteorostrata* (Clavicipitaceae, Hypocreales, Ascomycota), which is also known to infect elongate hemlock scales in their natural range in Japan. To facilitate the formulation of this strain for application on Christmas trees, we will conduct bioassays using several *Conoideocrella luteorostrata* strains against the various life stages of elongate hemlock scale, to determine their optimal growth conditions (e.g., media and temperature tolerance), and investigate their interactions with other members of the fungal microbiome.

Funding: Christmas Tree Promotion Board

6. Histological characterization and cytogenic authentication of adult human epidermal keratinocyte (HEKa) cell line

Hailey Brooks (Beckley, WV)

Institution: West Virginia University Institute of Technology
Field: Health Sciences (Biology)
Faculty Advisor: Adrienne Williams

Cell line contamination hinders research and provides unreliable results. Cell line authentication as a precursor to cell-based research should help prevent use of cross-contaminated cell lines and improve research reproducibility and authenticity. For this study, adult Human Epidermal Keratinocyte (HEKa) cells were cultured for a skin model project but began exhibiting noticeable variation from typical epithelial morphology. Morphological analysis via cell imaging led to further investigation to clarify sources of possible contamination. Genetic analysis consisted of STR profiling, which results showed a single donor and indicated no previously identified human or animal cell line cross-contaminates. To test for multiple cell type contamination, transcriptional analysis followed to determine if cells showed gene expression markers for keratinocytes or melanocytes.

Funding: West Virginia University Institute of Technology

7. Additional Species Diversity of the Rhinebothriidean Genus Stillabothrium.

Hannah Hudson (Dunbar, West Virginia)
Saira Rizwan (Morgantown, West Virginia)

Institution: West Virginia State University
Field: Sciences (Biology)
Faculty Advisor: Timothy Ruhnke

The rhinebothriidean genus *Stillabothrium* was erected by Reyda et al. (2015) for seven cestode species parasitic in stingrays and guitarfish. The genus now houses nine species, with others identified via molecular analysis, but not yet formally described. Collection of rays from the Pacific and Indian Oceans have allowed for continued molecular prospecting for members of this genus. Thus far, 28S rDNA has been sequenced for samples from the following host species: *Maculobatis astra* (NT-26) from Australia, *Maculobatis* cf *gerrardi* 6 (MZ-16) from Mozambique, and *Rhinobatos schlegeli* (TW-16) from Japan. Thus far, sequence analysis has revealed the following: *M. astra* hosts two morphotypes of *Stillabothrium*, one species allied with *S. jeanfortiae* and one allied with *S. cadenati*. Two specimens of *Stillabothrium* sequenced thus far from *M.* cf *gerrardi* were also found in the clade with *S. jeanfortiae*. The rhinebothriidean cestodes collected from *R. schlegeli* are consistent in morphology with *Phyllobothrium biacetabulum*, originally described by Yamaguti (1934). The morphological study of specimens has revealed the species consistent with other species of *Stillabothrium,* and analysis of ribosomal sequence has placed the species within the clade containing other *Stillabothrium* species. The continuation of this study has been the identification of various morphotypes among specimens from the host species *Maculobatis astra* (NT-26) and *Himantura australis* (CM03-24). The groupings of the morphologies are to be used as part of a study series for further validation of the molecular results for possible description.

Funding: Summer Undergraduate Research Experience (SURE) / Division of Science & Research HEPC

8. Effects of CHD8 mutation on intestinal motility and peristalsis rate in a larval zebrafish

Syed Ali (Princeton, West Virginia)
Kayse Coleman (Bluefield, West Virginia)

Institution: Bluefield State College
Field: Sciences (Biology)
Faculty Advisor: James Walters

Patients with Autism Spectrum Disorder (ASD) often have a comorbidity that includes GI distress, including constipation. We used Zebrafish (*Danio rerio*) to model the ASD GI constipation as they are optically transparent, and physiological processes are readily observed by microscopy. Our hypotheses are that CHD8-/- mutants will have a slower intestinal transit rate (constipation) due to reduced peristalsis (gut movement), CHD8-/- Mutants would have an overall lower peristaltic activity, and CHD8-/- Mutants would have uncoordinated peristalsis. To determine the rate of food transit through the larval intestine and to visualize the Intestinal tract, larvae were fed with fluorescent beads mixed with a regular diet. Our study shows that the presence of food inside the gut after 24-hour post feeding is directing towards the inability of the CHD8-/- Mutant larvae to pass food at a standard rate. Surprisingly, peristalsis in CHD8 -/- larvae had a higher mean rate of muscle movement as compared to wildtype siblings. These data suggest that uncoordinated peristaltic contractions in CHD8-/- mutants lead to autism linked constipation. Future directions include a screen for other genes that may be associated with autism.

Funding: WV-INBRE, NIH

9. Antagonism of Pseudomonas Aeruginosa Using Novel Bacteria to Develop Probiotics

Jaelynn Parks (Lewisburg, WV)

Institution: West Virginia University Institute of Technology
Field: Health Sciences (Biology)
Faculty Advisor: Matthew Williams

Disease in humans often develops upon an encounter with pathogenic bacteria. *Pseudomonas aeruginosa* is an opportunistic pathogen that commonly grows in moist areas. Traditionally, to counteract the effects of these pathogens, we have administered antibiotics. However, antibiotics can be harmful to commensal flora and the challenge of antibiotic resistance continues to arise. According to the CDC, 32,600 infections occurred in hospitalized patients in the year 2017, all of which were multidrug resistant. The solution could potentially be probiotic bacteria, which are bacteria that can be administered to offer benefits to human health. Probiotic bacteria often introduce a factor that has the ability to antagonize unwanted pathogens while simultaneously promoting the health of symbiotic bacteria. As research advances, probiotics have become more common in not only preventative measures, but treatment as well. The purpose of our antagonism studies was to evaluate the efficacy of novel isolates in preventing the growth of pathogenic bacteria. Antagonism can be modified to determine whether the isolate works best as a treatment or a preventative measure. This study evaluated isolates as a preventative measure using 48-hr antagonism assays. Several isolates demonstrated successful antagonism with consistency across multiple trials. Isolates were also measured in terms of treatment by simultaneous antagonism and each were still successful in inhibition of the pathogen. These isolates were then identified by bioinformatic analysis of their genomes, which were determined using 16S genetic sequencing. These novel bacteria hold the potential to combat multi-drug resistant *Pseudomonas aeruginosa* through preventative measures as well as post-infection treatment.

Funding: West Virginia University Institute of Technology

10. Morphological and Physiological Variations Associated with Reproductive and Vegetative Salinity Tolerance in Sorghum

Emmelia Braun (Morgantown, WV)

Institution: West Virginia University
Field: Sciences (Biology)
Faculty Advisor: Jennifer Hawkins

Salinity stress is one of the most severe limitations on crop yield. In order to ensure the availability of quality grain-based products, it is imperative to identify genotypes of crop species that maintain grain yield under saline conditions. *Sorghum* is a staple cereal crop grown in Africa, one of the areas hit hardest by temperature and precipitation modifications associated with climate change. As a result of its cultivation in arid environments, some *Sorghum* genotypes are drought tolerant, likely contributing to the osmotic tolerance observed under saline conditions. In this work, *Sorghum* will be used as a model to assess the relationship between vegetative and reproductive tolerance under salinity stress. Twenty-five diverse genotypes will be used to evaluate the responses to salinity stress associated with domestication. In addition, thirty-four *S. bicolor* inbred BTx623 mutants, selected for mutations in either aquaporin-coding genes or genes within previously identified loci related to the salt stress response, will be grown to analyze the effects of these mutations on salinity tolerance. Three replicates of each genotype will be exposed to either control (tap water) or saline (75 mM NaCl) conditions until the resulting grain reaches maturity, and a suite of vegetative and reproductive traits will be measured. The results from this research will identify genotypes with greater vegetative and reproductive tolerance in saline conditions that can be grown on marginal lands and/or irrigated with saline water, ultimately maximizing grain yield to provide quality food products for the growing population.

Funding: West Virginia University

11. Microplastics in Rivers and Streams

Cedric Drennen (Clifton Forge, VA)

Institution: Concord University
Field: Sciences (Biology)
Faculty Advisor: Thomas Ford

In the environment, there are plenty of obstacles that arise against it. Pollution in the atmosphere is seen everywhere in the world, but sometimes it is not seen. Microplastics determine as primary (tiny particles such as cosmetics) and secondary (larger plastics that are broken down by abrasion and other factors) plastics that are 5mm or less. Microplastics disperse in the environment depending on the density will determine its role in-depth it will settle in the water. Many microplastics are found in one sample of a bottle and often found in invertebrates feeding on the bottom for food. Microplastics vary in location from 1 million pieces per cubic centimeter to 1 piece per 100 centimeters. Stream and rivers are not often studied, and most marine studies have been researching microplastics. More reviews of microplastics in-stream/rivers can help researchers understand if this is a potential threat. In this study, the research will not establish the potential health risks of microplastics against organisms. The research will show the prevalence of microplastics, the ingestion of microplastics in freshwater organisms, and factors that influence microplastics' density in southern West Virginia. The procedures are to find streams/rivers, take a sample, filter the water with filter paper and use a microscope to see the filter paper's objective using a probe to determine if the object is a microplastic or organic matter. Sample purity is the most significant task in researching, so appraised to exclude any airborne microplastics or clothing made of plastic that might contaminate the sample.

References

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Funding: McNair

12. Understanding Biomarker Expression in Association with Graded Recoil Analysis Following Shooting

Ryan Vaught (Beckley, WV)

Institution: Marshall University
Field: Sciences (Biology)
Faculty Advisor: Holly Cyphert

Blood biomarkers have recently been linked to diagnosing traumatic brain injuries (TBI). Glial fibrillary protein (GFAP) is one biomarker being tested in addition to ubiquitin C-terminal hydrolase-L1 (UCHL1) and S100B, all proteins that assist in neuronal and glial cell function. As new markers are being recognized, it's unclear how they are altered in circumstances beyond severe TBI. Recently, it has been reported that shooting a gun is associated with side effects similar to concussion, such as ringing in the ear and headaches. As shooting is a very population sport, we sought to understand if there was a connection between neurobiomarker expression and graded shooting events. Subjects recruited shot 25 rounds or 100 rounds from a 12-gauge shotgun at a gun range. The participants had their blood drawn prior to shooting, 30 minutes after shooting and 24 hours after shooting. Plasma was extracted by centrifugation and examined via an enzyme-linked immunosorbent assay (ELISA) kit specific for the GFAP and UCHL1 protein. The data suggests both GFAP and UCHL1 levels trend upward following shooting. The experimental GFAP levels (4-10 ng/ml) correlated positively with published data (3-7 ng/ml) for mild TBI injuries. In addition to the biomarker expression being observed, firearm and shooter velocity is being determined via video-based motion capture and inertial movement sensors. In total, we present data that suggests neurobiomarker expression is elevated following shooting events and continue to explore how this is correlated with G-forces of recoil, shooting experience (novice vs. professional), and repetition (25 rounds vs. 100 rounds).

Funding: NASA

13. Pleurotus ostreatus as a Biodetector for Identification of Pharmaceutical Contamination in Surface Water

Maria Irfan (Charleston, WV)

Institution: West Virginia State University
Field: Sciences (Biology)
Faculty Advisor: Douglas Bright

Pharmaceuticals are substances used in the diagnosis, treatment, or prevention of disease for restoring, correcting, or modifying organic functions. They can be found in products such as medications, hand and body lotions, and ointments. Over 4000 pharmaceuticals are used across the globe for medical and veterinary healthcare. These pharmaceuticals pass through waste treatment plants and are released into the ecosystem causing harm to wildlife. Mycoremediation is a form of bioremediation that involves the use of naturally occurring biological organisms, such as fungi, to degrade or sequester harmful contaminants in the environment. It is considered a cheap, effective, and environmentally friendly way to remove a wide variety of toxins from the environment. Mushrooms, such as oyster mushrooms (*Pleurotus ostreatus*), are often used to remove contaminants because they have unique characteristics, such as large biomass and tough texture that allow them to act as biosorbents. *Pleurotus ostreatus* was grown in 10T injectable grow bags using nanogram concentrations of pharmaceutical stock solution while some bags were not inoculated with a pharmaceutical to act as controls. The fruiting bodies and mycelium of the mushrooms will be obtained as samples which will be tested using liquid chromatography mass spectrometry in an attempt to detect the pharmaceuticals or their metabolites. The results will determine if *Pleurotus ostreatus* can act as a biosorbent and whether it can be used as a biodetector to identify pharmaceutical contamination in surface water.

Funding: NSF EPSCoR RII Track 1 OIA #1458952

14. Impacts of Microstegium vimineum Invasion on Native Plant Species

Catherine Morris (Cross Lanes, WV)

Institution: University of Charleston
Field: Sciences (Biology)
Faculty Advisor: Mark Watson

Around the world natural ecosystems are being challenged and degraded by invasive species. WV is not immune to these pests. In particular, invasions of non-native grasses have a substantial impact on native species populations. This study will quantify the detrimental effects of an invasive grass and how native species cope with this change. Japanese stiltgrass (*Microstegium vimineum)* is an emerging species in the eastern United States. It is most abundantly found in highly disturbed areas such as trails and roadsides. Certain environmental conditions, forest feature, and soil conditions promote the growth and spread of the invasive grass. *Microstegium vimineum* effects the soil and tree growth where it invades. While there is generous information regarding the ecology and spread of Japanese stiltgrass, limited research has been done to determine the effects of the invasion on native communities. 30 plots ($0.5m^2$) were randomly selected in disturbed, moderately disturbed, and undisturbed locations. Canopy cover was measured at each location, and the undisturbed location was defined by having less than 20% or less canopy cover. The stems of Japanese stiltgrass were counted, and the native species were identified and quantified. The relationship between land disturbance and stem count was found using this data, and the native species counts were used to understand how the severity of the invasion affects the surrounding populations. Stem count was highest in the moderately disturbed area with the lowest count of native species and second highest in the disturbed location.

Funding:

15. Water Quality and Microbial Community Physiological Profiles in a Stream on a Multi-use Trail

Jacob Slate (Mount Carbon, West Virginia)
Kendra Legg (Red House, West Virginia)
Abigail Williams (Eskdale, West Virginia)

Institution: University of Charleston
Field: Sciences (Biology)
Faculty Advisor: Aida Jimenez-Esquilin

The trail near Polly hollow at the Kanawha State Forest is a multi-use trail designated for hiking, biking, horses, and authorized vehicles. We hypothesized that there would be an impact to the water quality of the nearby stream due to use. Water samples were collected in a stream 60 m into the trail at different locations in relation to the trail and taken back to the lab to test the water pH, turbidity, and nitrate levels and to inoculate Biolog EcoPlates ®, which measure microbial community functional structure. Principal component analysis showed aquatic microbial community up trail was different than that down the trail (PC 1 79%; $p<0.1$) and the microbial communities up trail degraded more cellobiose, galacturonic acid and malic acid (all by-products of plant decomposition). Communities down trail correlated with lower functional richness ($p=0.016$) and favored degradation of glycerol phosphate. Microbial communities in the water directly across the trail were a functionally in between. Water quality variables were not significantly different among any of the locations, however, Nitrate levels exceeded the recommended drinking safety level for all samples. Microbial community diversity measures did not correlate with any chemical variable. This preliminary data suggests that there is an active microbial community in the water column and that other water related variables may have an impact on its function. Further trials are underway to determine if other chemical variables can explain the differences in microbial communities and if ecoplates could be useful for routine monitoring of stream quality.

Funding: NSF S-STEM Grant Award # 1930362

16. Exploring Species Boundaries for Neonectria magnoliae

Hannah Petronek (Morgantown, WV)

Institution: West Virginia University
Field: Sciences (Biology)
Faculty Advisor: Matt Kasson

Fungi in the family Nectriaceae include several notorious plant pathogens that cause tree canker diseases. Cankers are localized death of tree tissue that form when pathogens—such as fungi—enter the tree through wounds, which are created by insects or other biotic and abiotic stressors. These cankers can girdle the tree and ultimately kill it. This type of plant pathogen includes *Neonectria* spp., which has been implicated in beech bark disease in American beech, as well as perennial target cankers in various hardwood and conifer hosts. In addition, *Corinectria* is a closely related genus that causes cankers on native conifers, such as spruce and fir. In the central Appalachian mountains, a recent survey uncovered *Neonectria magnoliae* causing perennial cankers on Fraser magnolia (*Magnolia fraseri*) and tulip-poplar (*Liriodendron tulipifera*) at different elevations. Phylogenetic data indicate *N. magnoliae* may include at least two cryptic species with a genus-specific host range, but more information is needed before drawing any conclusions. To help further define species boundaries, we have collected additional isolates of *N. magnoliae* from both hosts in West Virginia, generated DNA sequence data, and conducted phylogenetic analysis. Their divergent morphology (only isolates from magnolia produce macroconidia) and distinct elevational ranges adds to the growing evidence that *Neonectria magnoliae* strains infecting each tree host may have recently diverged into distinct species. Follow-up mating type compatibility studies and cross-pathogencity studies (strains from magnolia are inoculated into tulip-poplar and vice versa) are underway to provide additional evidence supporting the species boundaries for these two closely allied populations.

Funding:

17. How changes in a nutrient sensing gene may impact Glyphosate resistance.

Jonathan Lipovich (Shinnston, West Virginia)

Institution: West Virginia University
Field: Sciences (Biology)
Faculty Advisor: Jen Gallagher

Glyphosate-based herbicides (GBH) are widely used and have a wide-range of effects on organisms. The molecular effects that glyphosate has is not fully understood. Glyphosate is thought to have an effect on amino acid sensors and TOR. TOR (Target of Rapamycin) is a conserved pathway that regulates cell growth and is active when amino acids are present. Glyphosate exposure inhibits TOR. Amino acid sensing plays an important role in organisms and may help us to understand how glyphosate works and why organisms have developed resistance. In an effort to understand the complex signaling pathways in response to glyphosate, genetic analysis of several yeast strains uncovered a polymorphism in *PTR3,* which encodes a member an amino acid signaling complex that senses the levels of the amino acids such as leucine. RM11, a glyphosate-resistant strain was isolated from a vineyard, and GSY147, a laboratory strain is sensitive. To determine if genetic variation in *PTR3* between these yeast contributes to differences of growth when different amino acids when exposed to GBH. To examine the effects of this polymorphism yeast strains were constructed to have one or the other allele of *PTR3* or no *PTR3.* We will examine the viability to grow in starvation by various means. These results will allow us to understand how organisms are effected by glyphosate and what role nutrient sensing has in cancer. Humans do not have the target for glyphosate, but do possess TOR. This may help us understand why cancer cells can grow when TOR is deactivated.

Funding: WVU Research Corporation

18. Hiking trail use impact on plant community composition and soil chemistry.

Abigail Williams (Eskdale, WV)
Angel Marcum (,)
Sydney Schliesser (,)

Institution: University of Charleston
Field: Sciences (Biology)
Faculty Advisor: Aida Jimenez-Esquilin

As humans advance into natural habitats for recreation, habitat fragmentation becomes a pressing matter impacting ecosystem health and biodiversity. Hiking trails dissect areas of habitat separating natural populations in a forest. Two trails were identified at the Kanawha State Forest (Charleston, WV), a single-use trail (SUT), used for hiking only and a multi-use trail (MUT) where hiking, biking and riding is allowed. We hypothesized that trail use would have an impact in plant community composition and soil chemistry and that this impact would be worsened in the multi-use trail. Quadrats (0.5 m^2) were placed at random on the forest floor every 20 m for 100 m on each trail. Comparison samples were taken 5 m away from each trail. Soil samples were also taken to assess soil chemical variables. Soil variables (moisture, pH, and soil N) were not significantly different near or away from the trails but soil phosphorus was slightly higher in the single use trail compared to the multi-use trail ($p=0.037$).Plant communities had higher species diversity away from the trail (H= 2.05) compared to near the trail (H=1.73) in the single use trail. Invasive honey suckle was found 5 m away from the single-use trail. Plant diversity was higher (H=2.17) near the multi-use trail where Japanese stiltgrass was detected. This preliminary study shows that plant communities near trails are affected and that diversity changes may be associated to invasive plant species. Future plans include determining if seasonal effects or soil biological variables explain these changes.

Funding: NSF S-STEM Grant Award # 1930362

19. New tapeworm species from sharks of Japanese and British Waters.

Amartya Das (Institute, West Virginia)

Institution: West Virginia State University
Field: Sciences (Biology)
Faculty Advisor: Timothy Ruhnke

As part of a larger study into the worldwide diversity of the tapeworms of sharks, skates, and stingrays, the morphology of a new tapeworm species (genus: *Scyphophyllidium*) from the Japanese topeshark, *Hemitriakis japonica,* and a new tapeworm species (genus: *Orygmatobothrium*) from the Starry smooth-hound, *Mustelus asterias*, were investigated. Morphological measurements for each specimen were made with a Zeiss Axioskop II or a Leica ICC 50W. 9 specimens were morphologically assessed for the first species and 12 for the latter. The morphological data for these two species are currently being analyzed for comparison to existing species. The parasite species diversity of sharks, skates, and stingrays is largely unknown, and given that elasmobranch species are increasingly a conservation concern, knowledge of their parasitic fauna adds to a better understanding of their natural history.

Funding: West Virginia State University

20. Constructing Schematics for a Novel Microfluidic Slide for in vivo Imaging of Larval Zebrafish.

Dakota Parnell (Bluefield, West Virginia)
Jesse Orell (Bluefield, West Virginia)

Institution: Bluefield State College
Field: Sciences (Biology)
Faculty Advisor: James Walters

Larval zebrafish (Danio *rerio*) are optically transparent at six- and seven-days post fertilization (dpf) which makes them viable research models for the study of metabolic and physiological processes. Previous methods to image zebrafish were limited to embryogenesis and early larval stages. Our goal is to design a novel micro-fluidic slide for mounting zebrafish that greatly extends the duration of time for *in vivo* imaging of zebrafish larvae that are six to seven days post fertilization (dpf), while supplying drugs/nourishment that are fluorescently labeled to observe unicellular processes. The ideal mounting slide will maintain the larvae in a mostly static condition, have channels to provide media exchange, nourishment, and/or drug treatments, and channels to flush waste and any lingering test conditions. A prototype (version 3) was manufactured by Dolomite microfluidics. Initial testing revealed that the larval bed was too large in scale. To optimize our prototype (V3), we used the Zeiss Discovery V8 microscope to recalculate our measurements for the larvae bed and construct a schematic for prototype V4. We have now re-imaged five each of six- dpf larvae and five each of seven- dpf larvae in order to adjust the measurements to the new average larval size.

Funding: This work was supported by NIH Grant P20GM103434 to the West Virginia IDeA Network for Biomedical Research Excellence and NIH Grant P20GM103434 awarded to Bluefield State College and the McNair Scholars Program.

21. Effect of a Silverman-Andersen Respiratory Severity Score-based CPAP Weaning Algorithm on Newborn CPAP Duration

Sierra Arbaugh (Cabins, WV)

Institution: West Virginia University
Field: Health Sciences (Biomedical)
Faculty Advisor: Stephen Akers

Background: Newborns who experience respiratory problems often require breathing support and admission to neonatal intensive care units (NICUs). Many of these infants are supported with continuous positive airway pressure (CPAP) devices. While initially needed, CPAP is not a benign intervention, especially when used longer than necessary. This study evaluated the impact of a weaning algorithm on the duration of CPAP use for newborns in the NICU.
Methods: We performed a retrospective chart review after implementing an algorithm to guide CPAP weaning and discontinuation based on the Silverman-Andersen respiratory severity score. Two time periods were compared to evaluate outcomes: December 2018 – June 2019 (pre) and January 2020 – June 2020 (post). Following data analysis, a quality control audit was performed to determine correct algorithm use.
Results: There were no differences in the duration of CPAP, time to first oral feed, or length of hospital stay. There was less supplemental oxygen use and more infants returned to room with their mothers in the post-algorithm period. Quality-control audits revealed that the algorithm was followed correctly in 32% of cases with the duration of CPAP, on average, 11h less than cases when used incorrectly.
Conclusion: An algorithm to guide weaning CPAP in newborns with respiratory problems did not reduce CPAP duration. However, the algorithm was used correctly in one-third of cases. When used correctly, the algorithm may result in shorter CPAP duration and improvement in other outcomes. Moving forward, quality huddles will be implemented to share these findings and provide education about correct algorithm use.

Funding:

22. Development of noninvasive oxygen imaging approach using water-dispersible micro particulate Lithium naphtalocyanine probes

Marissa Gibides (Fort Worth, Texas)

Institution: West Virginia University
Field: Health Sciences (Biomedical)
Faculty Advisor: Andrey Bobko

Introduction: Blood flow associated with tumor vasculature is often irregular, sluggish, and intermittent. This results in areas of hypoxia, which is a common feature of new, abnormal growth. It is known that the presence of these hypoxic cells leads to therapeutic resistance in preclinical tumors as well as harming the ability to control human malignancies. In this study, we developed a noninvasive oxygen imaging approach using a water-dispersible micro particulate LiNc-BuO probe.
Results: Lithium naphtalocyanine probes (LiNc-BuO) were prepared using microfluidics techniques which generate uniform microparticles with a diameter in the range 5-20 μm dispersible in the water solution. Microparticles were coated with different coating: cell-adhesive polydopamine, native to tissue microenvironment hyaluronic acid, and just bare lithium naphtalocyanine surface. In vivo experiments of microparticles biocompatibility and distribution in tumor tissue were performed using an orthotopic model of mammary tumor in mice. PyMT tumor cells (0.5 million) and microcrystal probe (0.5 mg) in 50 uL media were injected in the mammary fat pad. Tumors were growing, measured, and imaged once a week till tumor size reached 1 cm. Tumors were collected, fixed cross-sectioned, and analyzed on the density of the particles in each layer. Tumors were then stained for the hypoxic areas.
Conclusion: Microfluidic technics allow for the production of uniformly distributed microparticles of various sizes. The coating of LiNc-BuO particles with biocompatible polymers (polydopamine and hyaluronic acid) significantly improves microparticles biocompatibility and tissue distribution. Developed approach allows for fast and accurate oxygen imaging in a pre-clinical tumor mouse model.

Funding: NIH

23. Effects of GPER1 Activation on Progestin Receptor Gene Expression in Meningioma Cells.

Zachary Matheny (Cross Lanes, WV)
William Yost (Buffalo, WV)

Institution: West Virginia State University
Field: Health Sciences (Biomedical)
Faculty Advisor: Gerald Hankins

Meningiomas (tumors of the meninges, the lining of the central nervous system) are the second most common primary intracranial tumors and constitute approximately 30% of all CNS tumors. Although most meningiomas are benign, about 5% are malignant. Also, complete surgical removal is often not possible. The pathobiology of meningiomas remains poorly understood however these tumors are significantly more common in women than in men. The female to male incidence ratio for meningiomas in adults is 2.2, while no such sex bias exists for meningiomas in children. This sex bias in adults is even more pronounced in meningiomas of the spinal column, which are approximately 10 times more frequent in women than in men. Therefore, female sex hormones have long been suspected to play a role in meningioma formation. The only published studies on sex steroid hormones in meningiomas have been on actions on the classical nuclear receptors. However, a series of investigations in recent years have demonstrated membrane-bound receptors for estrogen and progesterone.
Previous work in the lab demonstrated that CH157-MN meningioma cells express and respond to activation of the G protein-coupled estrogen receptor (GPER1). Further, these cells express at least three of the seven G protein-coupled progesterone receptors and the two other known membrane bound progesterone receptors, progesterone receptor membrane components 1 and 2. Given the crosstalk between estrogen and progesterone signaling pathways, the objective of our research is to examine the effect activation of the G protein-coupled estrogen receptor, GPER1, on progestin receptor gene expression.

Funding: Z. Matheny was supported by an award from WV Higher Education Policy Commission Division of Science & Research to WV State University for the Summer Undergraduate Research Experience (SURE) and W. Yost by a U.S. Department of Education Title III grant to WVSU.

24. The Use of Biochar for Removal of Selenium and Heavy Metals from Water

Devin Danford (Hurricane, West Virginia)

Institution: West Virginia State University
Field: Sciences (Chemistry)
Faculty Advisor: Amir Hass

Water quality of West Virginia has been impaired by the rich history of coal mining in the region. Elevated levels of selenium and heavy metals have shown to adversely affect stream ecology and ecosystem services. In this study, using batch sorption assays, we evaluated the use of southern yellow pine biochar as a sorbent for removal of selenium and heavy metals from water. Biochar, a charcoal-like material rich in carbon, is known to have physical structure and high surface area that contributes to its ability to remove metals and other contaminants found in water and air. In our initial assays (using 1.00 mg L -1 of the target element added as nitrate salt), biochar showed limited potential for the removal of selenate (0%) and selenite (0%), with moderate ability for removal of copper (43%), and cadmium (71%). By further modifying the biochar with organic compounds known to have high affinity to metals (i.e. chitosan, and poly-diallyldimethylammonium chloride [PDDA]), we improved biochar efficiency. The chitosan-modified biochar removed 83% selenate but none of the selenite. And while more than double the removal of copper (89%), it has adverse or no effect on the removal of cadmium (63%). On the other hand, and while having only minor impact on selenate and selenite removal (6%, and 0%, respectively), PDDA-modified biochar markedly enhanced copper (98%), and cadmium (100%) removal. These findings show that selected biochar modification can be engineered and tailored for removal of specific metals of interest.

Funding:

25. A Shorter Synthesis of an Aluminum Complexing Ligand

Rachel Minney (Parkersburg, WV)

Institution: West Virginia State University
Field: Sciences (Chemistry)
Faculty Advisor: Micheal Fultz

Aluminum is a harmful metal that appears in water systems across Appalachia. It is important for water quality personnel to be able to quickly tell the amount of aluminum present in a water source. The ligand (E)-1-(5-ethynyl-2-hydroxystyryl)napthalen-2-ol will be able to complex aluminum, which causes it to luminesce under fluorescent light. This behavior is ideal for the molecule to be used as an aluminum indicator on sensors in waterways. To make this ligand, two molecules must be synthesized and joined. Originally, a Wittig reaction was to be used, but a shorter synthesis has been designed that utilizes triethyl phosphite instead of triphenylphosphine and eliminates the need to protect the alkyne on the first molecule. Presently, the second of the two molecules has been successfully prepared by producing three variations of the starting material, 2-hydroxy-1- naphthaldehyde, with different protecting groups for the alcohol. The first molecule is still being synthesized, with completion of protecting the alcohol with a pivalate group and creating the alkyne using the Ohira-Bestmann modification of the Seyferth-Gilbert homologation. Bromination of the alkyne is currently in progress, using NBS and heat. Future actions include adding the triethyl phosphite to the first molecule and then joining it with the second molecule. The last step is a deprotection to yield the desired final product, (E)-1-(5-ethynyl-2-hydroxystyryl)napthalen-2-ol. The major method of purification for this reaction sequence has been column chromatography. Proton NMR has been the primary tool used to confirm formation of the products.

Funding: NSF EPSCoR RII Track 1 OIA #1458952 and the NASA WV Space Grant Consortium

26. Long term effect of mountaintop removal valley-fill mining on watershed water quality

Olivia Lim (Charleston, West Virginia)
Robert Cantrell

Institution: West Virginia State University
Field: Sciences (Chemistry)
Faculty Advisor: Amir Hass

Mining operations in the Appalachian region adversely affect stream water ecology and quality. Reclamation practices develop and deploy to mitigate such legacy and to restore site ecosystem services. In this study we evaluated the impact of mountaintop removal valley fill (MTVF) mining operation on headwater stream water quality 15 years after final release of the reclaimed mine site. The MTVF was reclaimed in 1994 and in 2000 the permit was revised and the site reseeded and planted for forestry post mining land use. Two watersheds, the MTVF reclaimed site and an adjacent undisturbed site of the same size and aspect were instrumented and sampled to monitor water flow and chemistry from November 2019 through October 2020. Total dissolved solids (TDS), pH, oxidation-reduction potential (ORP), dissolved oxygen, temperature, and flow rates were measured continuously in one key location at each watershed. Additional bi-monthly water samples were collected at different locations up and down the MTVF headwater and further down the combined watershed. Water samples were further analyzed for ionic and element composition. Twenty-five years after initial reclamation, and 15 years after final bond release, water quality at the reclaimed headwater shown to still be affected by the mining disturbance. Elevated levels of pH and TDS decreased with distance from the MTFV toe, but were still high compared to the undisturbed watershed and to TDS regulatory thresholds. High temporal fluctuations were associated with temporal changes in precipitation and meteorological conditions.

Funding: This work is supported by McIntire-Stennis Cooperative Forestry Program grant no. Nl20MSCFRXXXG004 project accession no. 1012709 from the USDA National Institute of Food and Agriculture

27. The Development and Composting of Cellulose-Based Bioplastic Derived from Hemp Fibers

Peydan McVicker (Farmington, WV)

Institution: Fairmont State University
Field: Sciences (Chemistry)
Faculty Advisor: Kristy Henson

The consumption and disposal of plastic products in landfills is drastically affecting our planet today. Though many of these plastic items can be recycled, most them are not. A demand for more sustainable products is imminent as the global rates of climate change continue to increase. An analysis of alternatives to plastic products indicates that a better option is the manufacturing and use of the cellulose-rich hemp plastic to increase rates of biodegradability. In this study, cellulose from locally grown hemp is extracted via acid hydrolysis and turned into bio-plastic sheets. The resulting sheets are composted and monitored to analyze and compare the rates of biodegradability compared to that of normal, everyday plastic products. Preliminary results indicate that the bioplastic is compostable and a better alternative to petroleum-based plastic products.

Funding: This research was made possible by NASA West Virginia Space Grant Consortium, Training Grant #NNX15AI01H

28. Synthesis of 2,3-diaminoanthracene

Ivie Minney (Parkersburg, West Virginia)

Institution: West Virginia State University
Field: Sciences (Chemistry)
Faculty Advisor: Micheal Fultz

Progress was made towards the formation of 2,3-diaminoanthracene to be used as a starting material for a bimetallic complex that will be explored as an anti-cancer agent. Current cancer treatments are burdened with harmful side effects. This bimetallic complex will help reduce these effects by offering a more selective cancer treatment that uses light to activate the molecule. Using a four-step synthesis starting with 2-aminoanthraquinone, 2,3-diaminoanthraquinone was eventually obtained. The first step consisted of reacting 2-aminoanthraquinone with ethyl chloroformate to yield anthraquinone-2-urethane. Next, a nitration of anthraquinone 2-urethane was preformed and 3-nitroanthraquinone-2-urethane was obtained. Third, the urethane group was reduced to an amino group to yield 3-nitro-2-aminoanthraquinone. Lastly, the 3-nitro-2-aminoanthraquinone was reduced to 2,3-diaminoanthraquinone with sodium sulfide in an aqueous solution. The reduction of 2,3-diaminoanthraquinone to 2,3-diaminoanthracene has been promising. A proton NMR has been done on the product, with assuring results, but a carbon NMR has yet to be done to confirm the 2,3-diaminoanthracene synthesis.

Funding: McNair Scholars Program

29. A Fluorescent Analysis of the Effects of Acidic and Electrolytic Media on Uranyl Nitrate

Austin Davis (Williamson, WV)

Institution: University of Charleston
Field: Sciences (Chemistry)
Faculty Advisor: Xiaoping Sun

Uranium in the environment poses a significant health hazards to both wild-life and human life. In the environment, uranium is most commonly found as a salt known as uranyl nitrate that is highly soluble in water and naturally fluorescent. The high solubility of uranyl nitrate allows it to dissolve easily into surrounding water, thus making it difficult to detect in most natural settings. However, even as a solution uranyl nitrate retains its fluorescence meaning with the proper equipment it can still be detected. A complication in this method is that though uranyl nitrate is naturally fluorescent in very low concentrations it can still be difficult to detect. The solution for this is when mixed with certain strong acids or electrolytic solutions the fluorescence can be amplified without altering the wavelength of the emission. This will allow researchers to detect a larger range of uranium in natural settings, while also expanding upon the understanding of uranyl nitrates fluorescent properties.

Keywords: uranium, uranyl nitrate, health hazard, high solubility, fluorescence, strong acids, electrolytic solution, amplify

Funding: West Virginia Science and Research Instrumentation Grant Program (Grant # DSR.20.11)

30. Organic Synthesis of Acylated Sucrose for Integrated Pest Management

Christopher Bias (Poca, WV)
Spelock Megan (Charleston, WV)
Moles Cierra (Clendenin, WV)

Institution: West Virginia State University
Field: Sciences (Chemistry)
Faculty Advisor: Michael Fultz

Acylglucoses have been shown to be an effective deterrent of tomato pests including green peach aphids, potato aphids, silverleaf whiteflies, and many others. These acylglucose mixtures are naturally produced and secreted by the *Solanum pennellii*, a wild tomato species that exhibits insect resistance. Hybridization of this tomato species with others produce the acyl sucrose that has additionally shown potential in greenhouse pest management. Previous research has developed synthetic pathways to synthesize the 2,3,4-triesterified monosaccharides. Taking this knowledge, work began on the total synthesis of polyesterified sucrose through a three-step process: Protection of the primary alcohols, esterification of the remaining alcohols, and deprotection of the primary silyl ethers. Future work includes testing of the acyl sucrose to compare with the acylglucose on the previously mentioned pests in greenhouse and high tunnels.

Funding:

31. Tweeting Sentiments: Textual Analytics for Emotion Variance Identification in the 2020 USA Election

Sean Woody (Dunbar, West Virginia)
Connor Kaufman (Charleston, West Virginia)
Robin Haesslich (Charleston, West Virginia)

Institution: University of Charleston
Field: Technology (Communications/Journalism)
Faculty Advisor: Jim Samuel

Millennials have grown up immersed in social media and have experienced different effects caused by social media platforms. Social media has grown from being a networking dimension to a dimension for diverse forms of expressions of opinions and views. In the months surrounding the 2020 election in the USA, people experienced uncertainty. Emotions flare up based on differing views and are expressed through social media, verbal, and written mediums. They can lead to diverse challenging and aggressive behaviors from spreading propaganda to amplification of fake news. In 2020, rising tensions about the election escalated people's behaviors on social media. People shared posts that show strong support or opposition for one of the two main presidential candidates: former Vice President Joe R. Biden (Democrat) and incumbent President Donald J. Trump (Republican). In this study we use data analytics to analyze and compare positive and negative emotions shown in social media posts about the two presidential candidates during the current year. The research will use Tweet data from Twitter to conduct sentiment analysis, textual analytics, and data visualization. We analyze samples based on a corpus of over five million tweets based on "Trump" and "Biden" keywords from the month prior to the elections, to draw insights on user sentiment toward candidates. The research will contribute to the development of a better understanding of how sentiment analysis and textual analytics can provide insights into public sentiment on topics of civic importance. This research identifies variations about people's sentiments toward the two candidates.

Funding:

32. Accountable Health Communities: Addressing Social Needs

Ashley Linder (Wheeling, WV)

Institution: West Virginia University
Field: Health Sciences (Community Health)
Faculty Advisor: Brianna Sheppard

Purpose: The purpose of this study was to evaluate the Accountable Health Communities Model implementation at an Awardee organization in West Virginia.
Methods: The Model requirements consisted of screening emergency room patients in-visit for core health-related social needs (housing stability and quality, utility needs, food security, transportation, and personal safety) and supplemental needs (physical and emotional disability). Patients were eligible to participate if they were considered community-dwelling Medicare, Medicaid, or CHIP beneficiaries. Beneficiaries who screened positive for one or more core needs and had visited the emergency room twice in the past twelve months were considered high-risk. 30% of the high-risk beneficiaries were randomized into the control group, 70% into the intervention group. The control group received a Community Resource Summary (CRS) containing personalized referrals to community resources. The intervention group was sent a CRS and contacted by a navigator who assisted them in addressing identified needs.
Results: Of the 265 eligible beneficiaries screened from January 2019 to April 2020, 59 were considered high-risk. The most common need cited was reliable transportation. Lack of housing/poor housing conditions and food shortages were the next most common. At the end of this evaluation period, 58% of identified needs were resolved in navigation cases, 29% of cases remained open, 10% were unresolved, and 3% of needs were identified by clients who could not be reached.
Conclusions: This implementation of the Accountable Health Communities Model successfully identified high-risk patients, allowing future studies to analyze the patterns of beneficiaries' cited needs.

Funding: Centers for Medicare and Medicaid Services, U.S. Department of Health and Human Services

33. Moris: Morisita Index-Based Countermeasure Against Sybil Attacks in Internet of Things

Cameron Prater (Cowen, WV)

Institution: Marshall University
Field: Technology (Computer Science)
Faculty Advisor: Cong Pu

Over the past few years, Internet of Things (IoT) has emerged as a promising paradigm that connects various physical devices to the Internet and has contributed to the development of countless next-generation applications. As a major enabler for IoT, IPv6-based Low Power and Lossy Networks (LLNs) has been receiving considerable attention as a mature solution for scalable data collection in a ubiquitous computing and communication infrastructure. To provide efficient point-to-multipoint and multipoint-to-point communication, a novel routing protocol for LLNs, called RPL, has been proposed and standardized. However, due to LLN devices' constraints on processing power, memory, and energy, as well as the lack of specific security models in RPL, LLNs utilizing RPL consequently become an ideal target for various cyberattacks. One such cyberattack that RPL is particularly vulnerable to is the sybil attack. To detect and mitigate these sybil attacks in LLNs using RPL, we have proposed a Morisita index-based countermeasure called *Moris*. In Moris, each node measures the density of MAC address identities in the received DODAG Information Solicitation (DIS) control messages to detect whether a sybil attacker exists among nearby nodes based on Morisita index theory. We plan to conduct extensive simulation experiments for performance evaluation and comparison with the existing RPL implementation, SecRPL, as well as two-step detection schemes.

Funding: NASA West Virginia Space Grant Consortium

34. Mutual Authentication Protocol for Internet of Drones

Andrew Wall (Scott Depot, WV)

Institution: Marshall University
Field: Technology (Computer Science)
Faculty Advisor: Cong Pu

With the miniaturization of electronic devices and advancements in wireless communications, unmanned aerial vehicles (UAVs), also known as drones, will find many new uses. Internet of Drones (IoD), a layered network control architecture designed mainly for coordinating the access of drones and providing navigation services, has increased involvement across civilian and military industries. Meanwhile, the security and privacy of IoD is gaining significant attention due to financial and strategic information involved in aerial applications. Regrettably, traditional security techniques cannot be directly adopted by IoD systems because of the resource constraints of drones. To address security and privacy challenges, we propose a privacy-preserving mutual authentication and key agreement protocol, also called PMAP, based on physical unclonable function and chaotic system to achieve mutual authentication and establish a secure session key between communication entities in IoD. The PMAP consists of two schemes: $PMAP^{D2Z}$, which authenticates drone and Zone Service Provider (ZSP) and establishes secure session key, and $PMAP^{D2D}$, which authenticates drone to drone and establishes secure session key. We present a formal security analysis to show that any adversary cannot obtain or alter critical communication information and the PMAP is immune to various security attacks. We also evaluate the PMAP through extensive simulation experiments and compare its performance with existing Li et al.'s and Wazid et al.'s scheme. The simulation results show that the PMAP can achieve better performance in terms of computation cost, memory usage, energy consumption and communication overhead, indicating a viable and competitive approach for securing communications in IoD.

Funding: WV Higher Education Policy Commission, Division of Science and Research

35. Learning Object-Oriented Programming Concepts with Augmented Reality

William Coleman (HUNTINGTON, WV)

Institution: Marshall University
Field: Technology (Computer Science)
Faculty Advisor: Husnu Narman

Teaching Object-Oriented Programming (OOP) concepts to students who do not have programming experiences can be challenging. Therefore, there are several computer-aided techniques to help students learn OOP more effectively. However, there is little work to determine the effects of Augmented Reality (AR) on student learning of fundamental computer science. Using a digital overlay to project computer-generated objects into the context of a real-world space, AR provides an engaging medium through which students may visualize and explore concepts, even abstract ones. Therefore, the primary objective of this research is to develop AR technology that will utilize AR models that demonstrate fundamental OOP concepts in a manner that increases student understanding, interest, and motivation to learn. The second objective is to test the AR technology in a classroom setting and gather feedback from students and instructors regarding their experiences. Specifically, our long-term goal is to determine how using the AR application affects student understanding, interest, and motivation regarding OOP topics compared to previously used teaching methods. The research expectation is that AR will be more effective.

Funding: WV Higher Education Policy Commission, Division of Science and Research

36. Intelligent routing Algorithm of Internet of Things with high efficiency and low power consumption

Samuel Temesgen (St. Albans, WV)

Institution: West Virginia State University
Field: Engineering (Computer Science)
Faculty Advisor: heng Wu

Internet of Things (IoTs) constitutes a network of various devices have some equipments with the mandatory facility of communication and optional facilities of sensing, information collecting, storage and processing. IoTs network has been used for research and development purpose in many application areas such as military environment, traffic management, and e-healthcare system. IoTs network is enormous in scale and complexity, mainly limitation in terms of energy efficiency because battery lifetime is limited. Routing algorithm play a vital role in facilitating the delivery of these packets from the source to the destination nodes. The running routing algorithms of IoTs are difficult and require a huge memory use and high energy consumption which were insufficient for IoTs network processing. The use of energy-efficient routing algorithm can help to reduce the power consumption of IoTs devices. We will propose a high efficiency and lower-power consumption intelligent routing algorithm for the IoTs that minimizes the energy consumption. This algorithm reduces energy consumption using 4 ways in IoTs: (1) Smart Sleep and Wake up Scheduling, (2)Intelligent Route Discovery in IoTs based on Software Define Network and Long-short Term Memory (3) Less Power Consumption Route for Communication (4) Reduce Overhead while Routing.

Funding:

37. A Hierarchical Aproach to Fine-Grained Visual Classification for Plant Image Analysis

Ram Zaveri (Morgantown, West Virginia)

Institution: West Virginia University
Field: Sciences (Computer Science)
Faculty Advisor: Gianfranco Doretto

Object classification from images is a standard problem in computer vision. State-of-the-art techniques are based on deep learning, a subfield of machine learning. While they perform well for generic object classification such as determining whether there is a cat or a dog in an image, there are application domains where they still fall short. One of them is the automated classification of plant species. This is a case where different plants might sometimes look very similar in pictures, while the same plant can appear very differently, because of the concurrent effects involved in the image formation process, which involve the shape of the scene, its material properties, the illumination conditions, and the viewpoint. We regard this scenario as a fine-grained visual classification problem "in-the-wild," since no restrictions on the imaging conditions are imposed, which makes the task at hand especially challenging. To address it, we have developed an approach based on state-of-the-art deep learning techniques to identify the hierarchy of plant organs appearing in an image. In order to test the approach, we have curated a new large-scale plant image dataset. We developed a tool for annotating plant images, which we used for labeling the plant organs. Our approach and the dataset will serve as a benchmark for future developments for image species classification in-the-wild.

Funding: NSF Grant Award OAC #1761792

38. Incorporation of Fresh Tissue Training for into General Surgery Residency

Kamil Abbas (Morgantown, West Virginia)

Institution: West Virginia University
Field: Health Sciences (Education)
Faculty Advisor: Daniel Grabo

Due to fundamental shifts in the nature of operative trauma cases, current cohorts of general surgery residents (GSR) are at risk of completing training with deficiencies in critical open surgery skills. Along with paradigm shifts in operative trauma management, the implementation of duty hour restrictions has been associated with declines in the volume of operative trauma cases. Realistic training and simulation models were developed utilizing perfused fresh human cadavers (PFHC). To assess the effectiveness of this fresh tissue training program (FTTP), GSRs actively participated in a year-long trauma surgery skills curriculum, culminating in training and simulation sessions utilizing the PFHC. Prior to the training sessions, GSRs reviewed educational materials such as operative videos and appropriate textbooks. Additionally, conventional pre- and post- examinations were administered to determine their understanding of crucial trauma management skills. During these training sessions, faculty assessed the competency of GSRs in key interventions and critical tasks for four major trauma operations, including neck exploration, left antero-lateral thoracotomy, trauma laparotomy, and control of abdominal vascular injury and lower extremity vascular injury. Upon reviewing the pre- and post-test scores of 8 post-graduate year (PGY) 4 GSR, a significant increase in the mean score was noted. Specifically, the 2019 cohort of 4 PGY4 GSR improved the collective mean score from 68.3% to 81.7%. Similarly, in the 2020 cohort, the pre-test's initial mean score was 76.7%, which increased to 86.7%. Based on the preliminary results, FTTP affords realistic training and simulations, allowing GSR to practice and execute critical trauma skills.

Funding: Department of Surgery, School of Medicine, WVU

39. Testbed Development for UAV Assisted Communications

Evan Allen (Williamson, WV)

Institution: Marshall University
Field: Engineering (Engineering)
Faculty Advisor: Imtiaz Ahmed

There has been a growing interest in the use of unmanned aerial vehicles (UAVs) for a variety of applications in commercial, industrial, and public-safety sectors. Moreover, UAVs have been envisioned to be an integral part in beyond fifth generation (5G) and sixth generation (6G) cellular communications networks. UAVs can work as a base station (hovering or in motion) or a relay in communication systems and hence can provide temporary coverage during emergencies or disasters or can enhance the overall network throughput by establishing better communication links between transmitter and receiver. Developing a testbed with UAVs and ground station while implementing standardized communication protocols is an essential task for the purpose of design and optimizations of communication systems and validating of their performances. In the department of Computer Sciences and Electrical Engineering at Marshall University, we are working on the development of such testbed for UAV assisted communications. Our first version of the developed testbed incorporates a number of routing protocols and show their comparative results. We conducted a number of experiments on the implemented routing protocols in different rural and urban environments and analyzed their performances. We are now working on the development of wireless channel models for air-to-ground and air-to-air channel models. As part of this development, we will observe the small and large scale channel gains, transmission path loss, coherence bandwidth, coherence time, etc. Our developed testbed will help us getting insights in algorithm designs for the commercial deployment of UAV assisted communication system.

Funding: Marshall University

40. Differences in Stepping Characteristics During the TUG Test with Aging and Neurodegenerative Disease

Melina McCabe (Wheeling, WV)

Institution: West Virginia University
Field: Engineering (Engineering)
Faculty Advisor: Jessica Allen

Underlying factors such as aging and disease can affect walking performance and ability. We investigated how foot placement during the Timed-Up-and-Go (TUG) test is modulated with aging and neurodegenerative disease. The TUG test is a clinical benchmark of walking independence that involves standing from a chair, walking 3m, turning, and walking back to the chair. A group of healthy young adult subjects, one middle-aged adult subject, and one middle-aged adult subject with diagnosed Multiple Sclerosis (MS) each performed multiple trials of the TUG test. We examined how the subject's step length, width, and variability differed between the groups. Preliminary data suggest that with MS, step length is largely decreased while step width is largely increased. No step length or width changes were found with aging. Furthermore, step length and width variability were largely increased with aging and MS. These results indicate that with aging and MS, normal stepping characteristics may be difficult to maintain. This study is the first step towards understanding the neuromuscular changes that occur in subjects with aging and neurodegenerative disease. This study also shows how walking performance and gait variability differ due to aging and MS, which may be a cause of an increased fall risk or unsteady gait in people with these conditions. These observations could eventually be used to develop better rehabilitation techniques and practices for patients with these underlying conditions.

Funding: Summer Undergraduate Research Experience (SURE) / Division of Science & Research HEPC

41. Microbial composition and diversity of biofilms and bulk water in drinking water distribution systems.

Christopher Anderson (Terra Alta, West Virginia)

Institution: West Virginia University
Field: Engineering (Engineering)
Faculty Advisor: Emily Garner

Ensuring the safety of drinking water delivered to the consumer's tap is paramount to maintaining public health. Despite treatment and disinfection, environmental bacteria that are well-suited to low nutrient conditions typical of drinking water can grow and colonize pipes as water travels from the treatment plant to the consumer. Hence, it is necessary for the scientific community to understand the diverse microbial environment within these distribution systems so that inferences can be made regarding how microbial community structure affects the ability for pathogens, such as Legionella pneumophila and Mycobacterium avium, to exist in the systems. This research applies bioinformatic techniques to characterize the microbiome within water and biofilm samples collected from four municipal drinking water distribution systems. Quantitative Insights Into Microbial Ecology 2 (QIIME2), was used to assign taxonomic classifications to raw genetic sequencing data targeting the 16S rRNA gene. Alpha and beta diversity were calculated for each sample's microbial community. Analysis is currently ongoing and future work will focus on identifying bacterial taxa and microbial community characteristics that are associated with the occurrence of pathogens in drinking water. The overarching objective is to highlight correlations between taxa that may be indicative of symbiotic or antagonistic relationships within sample bacterial communities and determine the significance of various physicochemical and biological properties affecting the drinking water environment.

Funding: West Virginia University and the Summer Undergraduate Research Experience (SURE) / Division of Science & Research HEPC

42. More Diverse than You Might Imagine: A Survey of Recent Young-Adult Appalachian Literature

Allison Ball (Daniels, West Virginia)

Institution: West Virginia University
Field: Humanities (English)
Faculty Advisor: Rosemary Hathaway

As part of the West Virginia University Honors College's Research Apprenticeship Program, we have been attempting to compile a comprehensive bibliography of Appalachian young-adult books. The faculty mentor, Rosemary Hathaway, regularly teaches a course on YA literature at WVU, and tries to incorporate Appalachian literature when possible, but has found it difficult to find YA books set in Appalachia--especially ones that don't conform to stereotypes. In an effort to take a closer look at this kind of literature, undergraduate researcher Allison Ball conducted a survey to determine how much literature of this genre was published over the last few decades and which ones are still in print.

We also discovered that little work has been done to describe this literature. The only existing resource we have found pertaining to our research is Herrin and Oliver's 2010 reference book, *Appalachian Children's Literature: An Annotated Bibliography.* Although Herrin and Oliver's book includes many children's books describing Appalachia and its people, it doesn't specifically break out YA books separately.

This poster presentation will define what we mean when we describe a young-adult novel as being "Appalachian," and will introduce viewers to the many, many books--old and new--we've come across that fall into this category. Compiling an extensive list and sharing it with viewers allows Appalachians to embrace the range of regional representations in these novels, and allows others to see how prevalent this literature is and debunk negative views of the region. Key to our research is including more texts that include characteristics of Appalachia while also representing diverse groups such as the LGBTQ+ community and other minority communities. Inclusivity is important not only to our research, but to give young Appalachians a sense of pride to be from Appalachia and to be reflected in its literature.

Funding:

43. Long-term effects of wildfires on water quality and vegetation growth

Zackary Laney (Franklin, WV)

Institution: University of Charleston
Field: Sciences (Environmental Studies)
Faculty Advisor: Heather Arnett

The effects of climate change are known to play a part in the prevalence and severity of wildfires through increased drought severity and more frequent, prolonged fire seasons. Prolonged, more frequent fire seasons will add further destruction on housing developments and wildlife, which is supported by a 16% increase in severely burned land. This project explored the long-term effects of these wildfire processes. By looking at various chemical aspects of water quality and vegetative growth after wildfires occur, we will be able to understand the effects more fully and how to combat them. Tests were conducted to measure the pH, nitrate, and phosphate levels of water at both a control and burn site in Fernow Experimental Forest, which is a temperate, hardwood forest that was last burned in 2009. Quadrants were used to measure the abundance of different grass species in these locations. Statistical differences were found between the control and burn sites for nitrate, phosphate, and pH. Levels of nitrate and pH were both lower at the burn site when compared to the control due to oxidation reactions that occurred during the fire, while phosphate was higher in the burn site due to possible smoke entrapment in the ecosystem. No statistical difference was found in grass species prevalence between sites. This allows us to gain valuable insight on the effects of wildfires so people may better plan for water treatment and wildlife rehabilitation.

Keywords: nitrate, phosphate, pH, climate change

Funding:

44. Rapid Electrochemical Sensing of Acetaminophen Utilizing Screen-Printed Carbon Electrodes in Forensic and Environmental Applications

Sara Kuberski (Morgantown, West Virginia)

Institution: West Virginia University
Field: Sciences (Forensic Science)
Faculty Advisor: Luis Arroyo

Drugs of abuse are rarely distributed as pure compounds and tend to be complex mixtures of various components. Since they are unregulated, these components can vary greatly. However, one common agent utilized as a diluent is acetaminophen. Additionally, frequent human use of acetaminophen, due to production and improper disposal of over-the counter drugs, introduces it into the environment and has been linked to wastewater presence. Therefore, it is important to provide a rapid way to characterize acetaminophen, so the goal of this work was to develop an electrochemical method capable of detecting this drug in different matrices of forensic and environmental interest. Electrochemical methods tend to be fast, inexpensive, and can be used outside of the laboratory. Acetaminophen demonstrated an oxidation peak at +0.289 V and a reduction peak at +0.0265 V in pH 9.5 Tris-HCl buffer, consistent with a reversible reaction. Calibration curves were constructed in triplicate to evaluate the method. The linear range was from 2 ppm up to 15 ppm (R^2=0.9922). The average slope of the calibration curve was 5.2 uA/ppm. The variation in the slope between the three curves was measured by %RSD, which was 5.8%. Based on these curves, the limit of detection was 0.57 ppm. The method has also been used to evaluate simulated samples and pharmaceutical products.

Funding: Summer Undergraduate Research Experience (SURE) / Division of Science & Research HEPC

45. Using Dermestid Beetles to Enhance Forensic Science Curriculum

Kiersten Lowdermilk (Clarksburg, WV)

Institution: Fairmont State University
Field: Sciences (Forensic Science)
Faculty Advisor: Kristy Henson

Dermested beetles are commonly used in museums and scientific research. Dermested beetles perfectly clean the bones minimizing biohazard waste and damaged caused by flensing or carrion eating animals. For this project I assisted in the colony size increase, maintenance, and the use of the dermested beetle colony in the Fairmont State forensic science program. Courses that utilize dermested beetle work include forensic anthropology, forensic biology, and forensic taphonomy. Beetles also aid in research projects for students and faculty conducting taphonomic research. To prepare specimens for forensic science courses I thaw and flense the specimen, then place it in the beetle tank. When finished bones are removed from the tank and degreased in a water and ammonia bath. After this process I prepare the skeletons for the needs of each course. Skeletal prep for classes includes inflicting various forms of trauma, skull and long bone cleaning for morphology comparisons, cleaning up decomposition activities, and prepping skeletons for various research projects. Dermested beetles have easily advanced laboratory and individual research activities in the forensic science program.

Funding: This work was supported by the National Science Foundation through the First2 Network (https://first2network.org) National Science Foundation INCLUDES Alliance under NSF cooperative agreements HRD-1834569, HRD-1834575, HRD-1834586, HRD-1834595, HRD-1834601 and the NASA West Virginia Space Grant Consortium, Training Grant #NNX15AI01H.

46. Using StraboTools for Compaction Gradients in Continuous Miocene-Modern Fine-Grained Volcaniclastic Successions, IODP Site U1437

Daniel Price (Falling Waters, WV)

Institution: West Virginia University
Field: Sciences (Geology)
Faculty Advisor: Graham Andrews

The IODP Expedition 350 recovered 1,800-m thick drill cores of volcaniclastic sediments from the Izu-Bonin rear arc (IODP Site U1437) in Japan. These deep ocean volcanic ashes and muds serve as a valuable record to study compaction gradients as they relate to the process of lithification and diagenesis. The core deposits are fragile, being especially soft in the upper 400-m areas. Because of this, the methods used to extract and segment the cores for thin sections may have disturbed the material. Initial naked-eye observations have attempted to account for any changes and deformations in the fabric of the cores resulting from manual manipulation. These observations were followed by a more quantitative analysis. StraboTools is a geologic app used in this study to identify deformations, striations, and other strain markers. By taking photos of thin sections and uploading them to the app, the app's Edge Fabric tool placed an ellipse with a circle in the middle around deformations. To prepare the thin sections for the app, images of the 1,800-m cores were divided into segments, then were cropped into subsections. These subsections were uploaded to StraboTools where they were screen captured with the measurements made by the app. Each subsection was reassembled back to their segments. This is the current stage where this research lies. After data collection is complete, the data will be combined with initial observations to derive compaction gradients. These gradients will be used to understand the rates at which volcanic sediment lithification occurs.

Funding: NSF Louis-Stokes Alliance for Minority Participation (LSAMP)

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP)

47. Rare Earth Elements (REE) association in organic and inorganic fractions of Appalachian coals: Implications on REE extractability and enrichment

Bennington Opdahl (Erdenheim, PA)

Institution: West Virginia University
Field: Sciences (Geosciences)
Faculty Advisor: Shikha Sharma

Rare earth elements are in immense global demand as they are essential for all the major advancements in energy, electronics, optics and defense industries. To meet the high demands, REE supplies are getting scarce and expensive due to the depletion of conventional ores and supplies. In the recent few years, coal and its combustion/waste byproducts have been explored as a potential source of REEs due to their enriched REE content and lower costs. However, the association of REEs in inorganic or organic fractions of different types of coal (especially in bituminous coals) is still not well understood. In this study, we investigate the association of REEs in different fractions of bituminous Appalachian coals by using a sequential extraction procedure. Coal samples from Fireclay, Sewell, Harlem, Little Clarksburg and Upper Kittanning of the Appalachian basin have been acquired for this study. The REEs associated with the exchangeable fraction, carbonates, Fe-Mn oxides, organic bound, and silicates fraction in different coal samples are being investigated. The preliminary results from these experiments will help in determining the mechanism of REE enrichment in bituminous coals. The broader implications of this study are that it will help in developing strategies for maximizing the extraction efficiency and minimizing the extraction cost of REEs from Appalachian coals.

Funding:

48. Love and Politics: Ippolita Maria Sforza and Early Modern Maternal Relationships

Jessica Hogbin (Hedgesville, West Virginia)

Institution: West Virginia University
Field: Humanities (History)
Faculty Advisor: Matthew Vester

When Ippolita Maria Sforza (1445-1488), a Milanese noblewoman, married Alfonso of Aragon, future king of Naples, in 1465, she knew that there was a chance she would never see certain members of her family ever again. Letters served as her link to her natal family. One of Ippolita's richest epistolary sources are the letters between her and her mother, Bianca Maria Visconti. Ippolita writes her mother often to express her emotions, such as her anger and sorrow over her husband's infidelity, and to ask important questions regarding topics like manners, philosophy, dress, and childcare. Their relationship is not just emotional, however, as it often takes a political form of Ippolita acting as an advocate for Milan in the Neapolitan court. This project will argue about the complicated relationship between noble mothers and daughters which was simultaneously affectionate and political in the early modern period. Through this research, not only will an understanding of the mother-daughter relationship in early modern politics be produced, but it will also give insight into how this relationship still influences our modern understanding of women and politics.

Funding: Summer Undergraduate Research Experience (SURE) / Division of Science & Research HEPC

49. Characterization of Interleukin-6 Regulation in Neuroinflammation

Claire Kelly (Bruceton Mills, WV)

Institution: West Virginia University
Field: Health Sciences (Immunology and Medical Micobiology)
Faculty Advisor: Gordon Meares

Interleukin-6 (IL-6) is a signaling protein called a cytokine that is involved in inflammatory response. This cytokine is responsible for initiating the synthesis of other select proteins involved in the inflammatory response and the growth and support of some immune cells. This protein is typically only expressed during inflammation and silenced under normal conditions to promote proper control of the immune response. Regulation that controls this pattern of expression is not completely understood. Because the code to produce a protein must be transcribed from DNA to mRNA and then translated, there are a variety of potential mechanisms that could be controlling the expression of IL-6. We hypothesize that the key regulatory component may lie within the untranslated region of the mRNA transcript. To test this possibility, we used the CRISPR/Cas9 gene editing technique to create IL-6 human glioma cell lines containing different mutations in the untranslated regions (UTR). We then isolated and sequenced the IL-6 UTR in our mutants to determine what mutations were introduced. We performed an enzyme-linked immunosorbent assay (ELISA) to measure the amount of IL-6 protein produced by each of these mutants under conditions that provoke IL-6 expression. We also measured the relative amount of the IL-6 transcripts (mRNA) being produced under these conditions. Knowing the mechanism behind IL-6 regulation will allow us to better understand the neuroinflammatory response. Understanding these basic science mechanisms will allow us to understand neurological diseases that greatly affect West Virginia (such as Alzheimer's disease and ischemic stroke) and pinpoint future therapeutics.

Funding:

50. Formation of Kidney Stone Phantoms and Dissolution using Pineapple Extract

Madison Lilly (Oak Hill, West Virginia)

Institution: West Virginia University Institute of Technology
Field: Sciences (Immunology and Medical Micobiology)
Faculty Advisor: Adrienne Williams

Kidney stones can be quite a painful experience and, although there is no cure for kidney stones, a variety of therapies are available to prevent and remove kidney stones. One thing that has been shown to help prevent kidney stone formation is sodium citrate. Although we know of its lessening effects on kidney stone formation, it is also important to look for other natural remedies which may show greater effect on kidney stones already in place. Pineapple (*Ananas comosus*) shows clinical promise for dissolution of kidney stones. In this study the goal was to create phantom kidney stones and test how to best dissolve them using pineapple extract compared to the typical sodium citrate as a control. To test this, phantom kidney stones were made using Ultracal30 with water in ratios of 1:1 and 100:28 g/mL, stirred, and then molded. Pineapple extract was created by boiling dehydrated pineapple at 95°C in distilled water for 10 minutes and then filtered. The phantom kidney stones were pre-wet, weighed, and then placed in microplate chambers and incubated in sodium chloride (negative control), sodium citrate (positive control), and the pineapple extract at 37°C and 5% CO_2 for up to 19 days. Preliminary results indicate pineapple extract shows effects on dissolution of pre-formed kidney stone phantoms. This research is important to focus on more natural medical approaches and could possibly save a lot of money and pain for people living with kidney stones.

Funding: West Virginia University Institute of Technology

51. Liver Kinase B 1 Regulates Antigen Presentation Genes in Brain Cells

Rylee Cisney (Blairs Mills, Pennsylvania)

Institution: West Virginia University
Field: Health Sciences (Immunology and Medical Micobiology)
Faculty Advisor: Gordon Meares

Adaptive immunity is the body's memory immunity and is also linked to autoimmune diseases, such as Multiple Sclerosis. Therefore, these results could contribute to the knowledge of these diseases. Previous data has shown that polymorphisms (mutations) in the Liver Kinase B1 (LKB1) gene may be a risk factor for Multiple Sclerosis. LKB1 is a ubiquitous kinase protein involved in the regulation of metabolism, cell growth, and inflammatory activation. LKB1 is known to regulate cellular responses induced by the inflammatory signaling molecules interferon gamma (INF-γ). IFN-γ commonly induces the expression of major histocompatibility complex class I and II (MHC). MHCs are molecules that help create a specific immune response to foreign bodies by showing them to immune cells. They do this by presenting pieces of proteins (antigens) to T cell receptors to induce an adaptive immune response. Our data show that gene expression of MHC class II and MHC class I is negatively regulated by LKB1 in response to IFN-γ. Moreover, we have identified that LKB1 regulates several additional genes involved in antigen processing and presentation in response to IFN-γ or IFN-α. We have identified that LKB1 is a potential checkpoint for adaptive immunity by constraining antigen presentation. Overall, these data may be important for understanding autoimmune diseases, such as MS, in which there is aberrant antigen recognition.

Funding:

52. Controlling COVID-19: An Epidemiological Model

Logan Rose (Sutton, WV)

Institution: Marshall University
Field: Sciences (Mathematics)
Faculty Advisor: Anna Mummert

Coronavirus Disease 2019 is a highly infectious disease caused by the novel coronavirus (SARS-CoV-2). It was first reported in Wuhan, China in late December 2019 and was declared a pandemic in March 2020. As of October 29, 2020, there have been over 44 million cases reported worldwide with over 1.17 million deaths (WHO). In late August, many colleges across the U.S. reopened with control measures in place. Some were able to successfully contain the virus while others experienced massive outbreaks. We model the spread of COVID-19 across a campus with a relatively small population (N=4000). We consider a differential equations model with Susceptible-Exposed-Infected-Asymptomatic-Quarantined-Recovered-Dead classes. We parameterized the model using real world values. Then we find a formula for the transmission rate based on the Basic Reproduction Number, R0. R0 was estimated to be 2.35 (Smith). Next, we develop an Optimal Control problem to minimize the Asymptomatic and Infected populations and the cost to implement the following control strategies: mask wearing and increased testing. Adjoint equations are derived and the effectiveness of each control measure is analyzed.

Funding: Marshall University

53. Standing with Our Sisters: Social Impacts and Media Platforms of the MMIW Movement

Portia Peterson (Morgantown, WV)

Institution: West Virginia University
Field: Humanities (Native American Studies)
Faculty Advisor: Bonnie Brown

In the United States and Canada, the number of missing and murdered Indigenous women has been steadily on the rise in recent years. The National Institute of Justice reported that 84% of American Indian women will have experienced violence in their lifetime, either domestically or otherwise (56% domestic violence/intimate partner-Department of Justice #s) and are 10 times more likely to be murdered than any other racial group. According to data collected by RAINN (Rape, Abuse & Incest National Network) the largest anti-sexual violence organization in the nation, Native American women are the highest risk group for sexual assault and abuse, being twice as likely than any other racial group. ("Victims of Sexual Violence: Statistics | RAINN." https://www.rainn.org/statistics/victims-sexual-violence".) Social media and news reports have begun to gain increased exposure as families and communities seek changes to current state and federal laws. This paper serves to examine the prevalence of violent crimes and sexual abuse in Native American demographics and the changes in social platforms that have been become tools for initiating public discussion. This reflection also includes the methods of adaption with traditional cultural practices and art as a means of healing, representation, and public exposure in the Missing and Murdered Indigenous Women's movement.

Keywords: Missing and Murdered Indigenous Women/MMIW, Native American sovereignty, Indigenous women, social media for social change

Funding:

54. Dim Light at Night Exacerbates Pain Associated with Chemotherapy

Rhett White (Clendenin, WV)

Institution: West Virginia University
Field: Health Sciences (Neuroscience)
Faculty Advisor: Jacob Bumgarner

Circadian rhythms are endogenous physiological processes that cycle across the 24-hour day with rhythms of approximately 24 hours. These rhythms are synchronized to precisely 24 hours by environmental cues, the primary of which is light during the day. Disruption of circadian rhythms by exposure to dim light at night (dLAN, ~5 lx) has been linked to a range of negative health effects, including peripheral and central inflammation and altered immune function. Our lab recently demonstrated that dLAN exposure exacerbates pain behavior in mice. Because of these findings, we sought to examine how dLAN may affect pain behavior associated with chemotherapy-induced peripheral neuropathy. We hypothesized that dLAN exacerbates pain behavior associated with chemotherapy induced neuropathy in mice. Female CFW mice received a 5-day injection regimen of either paclitaxel (2mg/kg/day) or vehicle and were placed in dark nights (LD) or dLAN conditions starting on the first night of injections. Pain behavior was assessed using three different assessments prior to and following treatment with chemotherapy. We observed that dLAN exacerbated the allodynia associated with paclitaxel treatment, but not warm and cold thermal challenges. Following behavioral testing, the periaqueductal gray (PAG) and rostral ventromedial medulla (RVM) were dissected for qRT-PCR analysis. This behavior was correlated with an observed upregulation of *Il-6* expression in the RVM. These findings represent a crucial step in expanding our understanding of how disruption of circadian rhythms impacts pain. Further, our results suggest that future pain management strategies should consider the effects of disrupted circadian rhythms on patient outcomes.

Funding: National Institutes of Health

55. Defining a Cell Growth Medium for Glioblastoma Cancer Management

Mackenzie Miller (Fayetteville, WV)

Institution: West Virginia University Institute of Technology
Field: Health Sciences (Neuroscience)
Faculty Advisor: Adrienne Williams

Glioblastoma multiforme (GBM) is one of the most lethal cancers in the world. Almost 12,500 people are diagnosed each year with GBM, then only about 35% survive past one year. This raises the need for research into glioblastoma. However, traditional laboratory techniques used to maintain glioblastomas in the laboratory fail to replicate their real-life 3-dimensional (3D) nature, which makes it difficult to find effective treatment options for patients. The purpose of this study is to find an effective laboratory growth condition for glioma cancer cells to form neurospheres (small neural cell clusters) and keep their original tumor characteristics. We will compare growth of glioma cells using traditional blood serum-based maintenance techniques to non-serum-based 3D maintenance. To do this, glioma cancer cells will be transferred to 60mm plastic dishes to promote 3D growth and kept at 37 degrees Celsius temperature with 5% carbon dioxide. In the experiment, the first condition will contain a typical blood serum-based growth medium as a control. The second experimental condition will comprise a non-serum-based growth medium containing a defined amount of essential cell growth factors. Cell growth will be monitored, and images recorded each day until neurospheres reach 150-200 micrometer in size. Once formed, neurospheres will be stained to evaluate if cells kept original tumor characteristics. Our hypothesis is that non-serum-based media would demonstrate increased tumor characteristics and neurosphere aggregate formation compared to the traditional serum-based medium growth condition. The results of this experiment will enhance the effectiveness of studying glioblastoma in the laboratory setting. Preliminary data was gathered by testing this novel cell culturing technique using an epithelial cell line to determine if it was successful in maintaining cell growth. The cell culturing technique used was successful in the growth of the epithelial cell line.

Funding: WVU-IT

56. Examining Relationships Between Neurodevelopment Genes and Transcription Factor Proteins in Zebrafish

Abreanne Andlinger (Moundsville, West Virginia)

Institution: West Virginia University
Field: Sciences (Neuroscience)
Faculty Advisor: Sadie Bergeron

Neurological disorders such as autism and schizophrenia are in part the result of mutations in the genes that control neurodevelopment, therefore knowing the connections between genes and transcription factors could eventually lead to treatments such as gene therapies to help people with these disorders. Transcription factors are proteins that have certain sequences they bind to on DNA and cause their targeted gene to be expressed more or less often. The purpose of this experiment was to determine if Gsx1/2 transcription factors regulate the expression of the genes *dlx5a/6a* in zebrafish. It is important to map out the target genes of the transcription factors Gsx1/2 because previous research has shown that they contribute to development of excitatory and inhibitory interneurons, and problems with signaling between these neurons is what causes neurodevelopment disorders. Gsx1 is also important in the visual system and contributes to the mechanism of prepulse inhibition which is disrupted in those with schizophrenia and autism spectrum disorder. The *dlx* genes are associated with autism spectrum disorder (ASD); *dlx5* is also associated with malformations in the hands and hearing loss. *dlx5* encodes a protein that is involved in several processes of early embryonic development. *dlx6* encodes proteins involved in early development of the forebrain and craniofacial structure. This research is still ongoing, but preliminary research shows Gsx1/2 regulates expression of *dlx5a*. By exploring the connections between transcription factors and genes in zebrafish, this research could be a model for the way these genes contribute to neurodevelopment in humans.

Funding: The Arnold and Mabel Beckman Foundation

57. Aberrant Cortical Networks for Multi-Sensory Processing in Autism Spectrum Disorder

Michelle Coleman (Smyrna, DE)

Institution: West Virginia University
Field: Health Sciences (Neuroscience)
Faculty Advisor: James W. Lewis

Autism spectrum disorder (ASD) typically results in impaired social and multi-sensory processing. Why this might be occurring is important for gaining earlier interventions. To better understand how the brain of someone with ASD functions, resting-state functional magnetic resonance imaging (rsfMRI) can measure changes in brain activity while a participant lies in a scanner without a task. Nineteen ASD and seventeen typically developing (TD) matched individuals were imaged at West Virginia University. Novel structural vector auto-regression (SVAR) analyses revealed significant rsfMRI functional connectivity differences between groups, including reduced flow of information in the ASD groups, which may contribute to behavioral outcomes in ASD. To confirm this result, the public Autism Brain Imaging Data Exchange (ABIDE Exchange), which contains thousands of participants from data collected nationwide, was used. The right extrastriate body area (EBA) showed a major interconnected hub in the TD groups, which processes complex body movements and is suggestive of different mechanisms by which TDs versus ASD individuals process sensory information. These findings contribute to potential methods for further analyzing rsfMRI data to aid in better understanding how the brains' of ASD individuals may differ.

Funding: West Virginia Clinical and Translational Science Institute (NIH/NIGMS Award Number 5U54GM104942-03) and the Summer Undergraduate Research Experience (SURE) / Division of Science & Research HEPC

58. Hypoxia Ischemia Induces Cathepsin L Secretion in Cerebrovascular Endothelial Cells

Linda Ma (Morgantown, West Virginia)

Institution: West Virginia University
Field: Health Sciences (Neuroscience)
Faculty Advisor: Xuefang Ren

Background

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 and participates in BBB opening in stroke. However, it is unknown which type of cells is responsible for the activation of this protease.

Goal

The goal of this experiment is to investigate whether Cathepsin L activity is generated during ischemia in Cerebrovascular Endothelial Cells (CEC).

Methods

CECs (bEND.3 cell line) in passages 25-30 were cultured in a 175 cm^2 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.

Results

Cathepsin L activity is decreased in the cells however increased in supernatant from CECs at 3 and 6 hours post ischemia *in vitro*.

Conclusion

Secretion of Cathepsin L is found in supernatant of CEC's in oxygen glucose deprivation conditions. This indicates that ischemia activates Cathepsin L in CECs. The data also suggests that CEC is a source of Cathepsin L in ischemia.

Future Direction

Further experiments on varying types of cells are to be studied for Cathepsin L activity.

Funding:

59. Combating Declines in Parkinson's and Alzheimer's Disease Through Recent Neurological Technologies

Olivia Oldaker (Bridgeport, WV)

Institution: West Virginia University
Field: Health Sciences (Human Performance)
Faculty Advisor: Scott Galster

Nearly 1 in 6 of the world's population suffer from neurological disorders and have detrimental declines in brain function. Parkinson's Disease (PD), a disease that invades nerve cells in the basal ganglia and the substantia nigra, is one that commonly comes to mind. Most patients with PD experience shaking, stiffness, and balance and coordination problems, which gradually worsen over time. Alzheimer's (AD) is another common neurological disease that people experience. The disease is rooted in the hippocampus and can move into the cerebral cortex in later stages. These patients experience memory loss, challenges in problem solving, confusion, and difficulty in completing everyday tasks. Over time, the Rockefeller Neuroscience Institute (RNI) has developed, utilized and researched technologies that can help combat these mental and physical declines in patients. HumanTrak and DARI movement assessment technologies have showed progression in PD and other technologies like Dynavision have helped AD patients. HumanTrak uses a 3D camera with wearable inertial sensors to help assess movements of patients, while DARI movement uses a 3D kinematic and kinetic motion analysis without the use of sensors. Dynavision aids in combating perceptual motor decline by initiating brain fitness. It evaluates and trains visual, cognitive and motor functions. There have also been studies with the Oura Ring which monitors heart rate, movement, and temperature for example. Lastly, if these do not achieve the desired results, clinical procedures can be used as a last resort. These include a focused ultrasound treatments, transcranial magnetic stimulation (TMS), and deep brain stimulation (DBS).

Funding:

60. Experimental Investigation of Filament Wound Custom Composite Rocket Body Tubes

Annette Straziuso (Morgantown, WV)
Emma Dorsey (Morgantown, WV)

Institution: West Virginia University
Field: Engineering (Aerospace)
Faculty Advisor: Patrick Browning

Composite filament winding is an automated process where a moving device wraps fibers around a rotating mandrel in a predetermined pattern. The X-Winder is a commercially available filament winder, it will be used with fiberglass material to manufacture rocket body tubes at various wind angles. The goal of this research is to identify efficacious combinations of composite materials, and wind angles that produce cured tubes with the highest strength-to-weight ratio, as determined by both destructive and non-destructive testing. The destructive and non-destructive testing consists of hydrostatic testing, Instron testing, as well as using strain gages. The students' plan is to identify the most efficient rocket body tube, along with establishing a database of statistical results, such as modulus of elasticity, yield strength, and Poisson's ratio. The latter serves to become a tool for use by future students and for other applications. The results collected so far represent the progress on the machine. The students have been able to successfully create three tubes with helical and hoop layers without any machine failures; which encourages the fact that tubes can be tested without concerns from construction. The beneficiaries of this research include the individual students, the WVU Experimental Rocketry Club and potentially all future engineering students who use the X-Winder system.

Funding: NASA West Virginia Space Grant Consortium

61. Treatment of Severe Cervical Spondylodiscitis with Combined Anterior and Posterior Surgical Instrumentation: Case Series

Brent Zutaut (Morgantown, West Virginia)

Institution: West Virginia University
Field: Sciences (Medicine)
Faculty Advisor: Shari Cui

Purpose: Cervical spondylodiscitis (CS) is a condition recognized for significant morbidity and disability. Surgical treatments vary based on the presence and extent of neurologic compromise and structural instability. Severe cases often require combined anterior and posterior (AP) surgical intervention. This case series describes one institution's experience with treatment of CS with AP surgery.
Methods: A retrospective chart review was performed to identify patients treated with AP surgery for cervical spine infection at Ruby Memorial Hospital between 2011 and 2019. Exclusion criteria included noninfectious etiologies and ages under 18. Demographics, comorbidities, lab results, surgical data, and the need for revision were collected for each patient. Descriptive statistics, logistic regression, and chi-square analysis were performed on the data.
Results: Eighteen patients met inclusion criteria. The average age was 48.8 +/- 11.5 years. Eleven were male and seven were female. Eight patients actively used intravenous drugs, six had diabetes, and six had hepatitis C. Five patients required revision for prior surgeries: two for postoperative infection of cervical hardware and three for failed prior stand-alone anterior surgery. One patient with index AP surgery required revision for recurrent infection.
Conclusion: CS is a complex condition affecting patients with multiple comorbidities. In this series, all AP operations demonstrated structural and neurological durability while three revisions of prior stand-alone anterior surgery were required. A more biomechanically stable construct at the index surgery may be preferable to prevent failure. More work is needed to compare risk factors for failure and specific outcomes of combined AP procedures for CS.

Funding:

62. The effects of bitter melon on bodyweight, triglyceride, and glucose levels in Drosophila melanogaster

Gannon Cole (Charleston, West Virginia)

Institution: West Virginia State University
Field: Sciences (Genetics)
Faculty Advisor: Umesh Reddy

Diabetes, obesity, and metabolic syndrome are becoming epidemic both in developed and developing countries in recent years. Complementary and alternative medicines have been used since ancient era for the treatment of diabetes and cardiovascular diseases. *Momordica charantia* popularly known as Bitter melon is widely used as vegetables in daily food in several Asian countries. The fruits extract of bitter melon has been suggested to have many biological activities, such as antioxidant and hypoglycemic activities. Recent scientific evaluation of this plant extracts also showed potential therapeutic benefit in diabetes and obesity related metabolic dysfunction in experimental animals and clinical studies. However, a focused research in Drosophila has not yet fully addressed. The fruit fly (*Drosophila melanogaster)* is used as a model organism to study disciplines ranging from fundamental genetics to the development of tissues and organs. These features, together with a brief generation time, low maintenance costs, and the availability of powerful genetic tools, allow the fruit fly to be eligible to study complex pathways relevant in biomedical research, including diabetes and obesity. The main objective of this study is to explore the changes in bodyweight, triglyceride, and glucose levels of Drosophila flies reared on diets supplemented with different bitter melon concentrations. Our findings will provide an insight related to body weight, triglyceride, and glucose levels reduction associated to bitter melon ingestion. These findings can serve as a basis for future translational studies in humans and possible drug targets against obesity and diabetes using bitter melon.

Funding:

63. Innovation Labs - Ending the Innovation Education Crisis in West Virginia Through Targeted Experiential Learning

Emily Thomas (Tornado, WV)
Eli Hughes (Alum Creek, WV)
Sydney Schliesser (St. Albans, WV)

Institution: University of Charleston
Field: Sciences (Innovation)
Faculty Advisor: Terry Cyfers

As technology advances into the unknown and explores new territories, West Virginia continues to be left behind in areas like business, entrepreneurship, innovation, and education. In 2019, West Virginia was ranked one of the worst states to conduct business. Consequently, as a direct result of the dwindling population and resources, the West Virginian education system began to struggle to keep up. By understanding the Innovation education crisis in West Virginia, Innovation Labs will provide valuable resources and push innovative thinking styles to the West Virginian youth. Innovation Labs will introduce materials and fulfill the already set science standards determined by the West Virginia education system for high school students. Through teaching tools of innovation like design thinking, entrepreneurship, and business, combined with the technology resources of coding, 3D printing, and electronics. Innovation Labs gives the student resources to think beyond and innovate their world. To make this an easy experience for the educators, lesson guides will be provided. As an outcome to this program, the youth in West Virginia will become the world's next generation of future innovators. Through the methods and resources provided by Innovation Labs, it becomes the catalyst of the great West Virginia Renaissance leading West Virginia into the future.

Funding:

64. Searching for Fast Radio Bursts with the 20 meter telescope at Green Bank Observatory

Tate Hawkins (Point Pleasant, West Virginia)

Institution: West Virginia University
Field: Sciences (Physics)
Faculty Advisor: Duncan Lorimer

Fast Radio Bursts (FRBs) are sudden and mysterious radio signals from deep space that were first discovered at West Virginia University (WVU) in 2007 by undergraduate student David Narkevic working with Physics & Astronomy Professor Duncan Lorimer. These bursts have been studied and observed at a number of radio observatories. As of now, over 100 FRBs have been observed, and 20 of them have been seen to repeat. One of these signals was found to source from an active neutron star called a magnetar in our Milky Way, but the rest are thought to be extragalactic in origin. WVU and the Green Bank Observatory (GBO) have worked together, and (thanks to State-funded infrastructure) WVU students and faculty have easy access to data servers and telescope operation. Using a 20 meter telescope at GBO, we are currently pursuing a variety of experiments to study FRBs. We describe here our ongoing targeted search for FRBs in the starburst galaxy, M82. This is motivated by the FRB-magnetar connection which predicts that 1 FRB-like burst per year is visible in the Milky Way. The extremely high star formation rates in starburst galaxies (some 40 times that of the Milky Way) leads us to expect a larger population of magnetars and, hence, FRB-like bursts. Making reasonable assumptions, we predict a rate as high as several bursts per week from M82 could be detectable by the 20 meter telescope. With funding from the NASA Space Grant and over 600 hours of telescope time available to us, made possible by a grant from the Research Corporation for Scientific Advancement, we are currently testing this hypothesis and the results will be presented here.

Funding: NASA Space Grant and Summer Undergraduate Research Experience (SURE) / Division of Science & Research HEPC

65. Low-Cost Fabrication of Thin-Film Flexible CIGS Solar Cells Through a Home Inkjet Printer

Yousef Abdelgaber (Milton, West Virginia)

Institution: Marshall University
Field: Engineering (Physics)
Faculty Advisor: Judy Fan

There is a critical need in the world today for the reduction in price of solar energy. Currently, second generation solar cells have been developed to replace the current silicon-based standard cells, of these new technologies, Copper-Indium-Gallium-Selenide (CIGS) based solar cells are the most popular candidate for a successor as they only require a thin-film coating of a few microns to be functional. Thin-film technologies have the advantage of requiring miniscule raw material, being coatable on flexible surfaces, and of being manufacturable on industrial roll-to-roll methods, and of these technologies, CIGS solar cells have demonstrated the highest efficiency. The obstacle currently restricting CIGS photovoltaics is that the thin-films are only manufactured using expensive vacuum-based particle sputtering machines, preventing roll-to-roll manufacturing, with high energy and material waste. Our research is to demonstrate the use of nanotechnology to produce a CIGS nanoparticles-ink for continuous thin-film deposition through the use of a modified home inkjet-printer, an ultra low-cost fabrication-method, made possible by the modern technology of high quality photo-printing. The objective is to transfer this phenomenal technology to photovoltaics, by growing the CIGS thin-film through controlled micro-droplet printing, opening the door to roll-to-roll direct manufacturing.

Funding: NASA West Virginia Space Grant Consortium

66. Examining Healthcare Spending and Mental Healthcare Efficacy

Ryan McFarland (St. Marys, WV)

Institution: University of Charleston
Field: Social Sciences (Political Science)
Faculty Advisor: Kara Fisher

This project seeks to understand the relationship between federal healthcare expenditures in the United States and the efficacy of our mental health services. Data collected from the Centers for Medicare and Medicaid Services and the Department of the Treasury are aggregated to describe federal expenditures noted as federal budgetary spending. Additionally, I consider healthcare costs as percentage of total U.S. gross domestic product. As a measure of mental health efficacy, I examine the mortality rate of mental illness as reported by the World Health Organization, as other indicators of healthcare efficacy are difficult to quantify and study. Study of these measures combined, provides greater insight to the accessibility, quality, and effectiveness of mental health services evidenced by governmental and private actors. I expect this study will lead to further consideration as to whether the mismanagement of federal funding, coupled with rising costs, has served to exacerbate the mental health challenges of our nation.

Funding:

67. Congressional Attention and the Opioid Crisis

Darren Ray (Wallback, West Virginia)

Institution: University of Charleston
Field: Social Sciences (Political Science)
Faculty Advisor: Kara Fisher

In the late 1990s the medical community saw increased prescription of opioid medications encouraged by pharmaceutical companied, which has led to widespread misuse of prescription and non-prescription opioids. By 2017, the United States department of Health and Human services declared a public health emergency. The crisis has negatively impacted the mental, physical, and economic health of the Appalachian region, particularly West Virginia. This study focuses on issue attention in the policy process and examines policy changes in opioid related legislation. Describing agenda setting is important not only for understanding congressional behavior in general but also for understanding the institutional context of other political behavior related to this topic. Specifically, I will examine shifts in congressional attention to the opioid crisis relative to the number of drug overdose deaths in the United States.

In order to study this, I complete a longitudinal analysis of the number of bills proposed in the United States Congress from 2014 to 2019 connected to opioid regulation as reported by Congress.gov. Similarly, I observe the fluctuation in the number of opioid deaths occurring in the same period for states with the highest percentage of deaths according to the CDC's age-adjusted rate. Previous research indicates that as congressional attention increases, the number of deaths is likely to decrease. In addition, periods of Congressional divide, in which each chamber of Congress is controlled by a different party, is considered as a measure of political polarization.

Funding:

68. Police Sexual Misconduct

Shan Esmer (Charleston, WV)

Institution: University of Charleston
Field: Social Sciences (Political Science)
Faculty Advisor: Kara Fisher

The Prison Rape Elimination Act of 2003 outlawed sexual activity between inmates and correctional staff members, consensual or not, due to the intimidating power imbalance between the two. This federal law doesn't apply to on-duty federal law enforcement officers and people under their authoritative care— it is left to individual states to decide. Currently, 31 states do not have laws closing this legal loophole on consent, including West Virginia (U.S. Senator Cory Booker, 2018). In this case study analysis, I compare data of reported sexual misconduct assault perpetrated by correctional officers (before and after PREA) to the available reports of police misconduct. In both cases, victims are unlikely to report. I find an increase in cases as officer's past record of performance issues, reluctance to harshly prosecute officers, and cases among the southern regions all increase. Similarly, the number of reports made by victims of rape or assault rise as government passes new policies to protect them, such as the Violence Against Women Act (1994) and the national standards of PREA. The findings of this study not only contribute to the scholarly literature but also have important implications for victims, law enforcement agencies, lawmakers, and others who contribute to the policy community.

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Funding: NA

69. Perceived Emotional Support

Hayden Woyan (Athens, WV)

Institution: Concord University
Field: Social Sciences (Psychology)
Faculty Advisor: Rodney Klein

Social support has been described as a key factor in adequate mental health and has been linked to influencing physical health as well (Hipkins, et.al, 2004). However, studies have failed to describe what type of social support has influenced certain aspects of mental and physical health, such as anxiety and depression, and to what extent. The current survey was distributed via Qualtrix to undergraduate college students enrolled in Social Science classes during the 2020 fall semester. The survey consisted of 56 multiple choice questions meant to examine the relationship between perceived emotional support and symptoms of both anxiety and depression. Results are expected to demonstrate a relationship between perceived emotional support and symptoms of anxiety, depression, or both. The results are expected to suggest emotional support plays a significant role in the mental health of undergraduate psychology students by displaying high levels of emotional support correlate with lower levels of anxiety and depression.

Keywords: Emotional Support, Depression, Anxiety, Correlational Study, Social Support

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Funding: McNair Scholars Program

70. Assessing Perioperative Patient Distress in Office-Based Hand Surgery

Anthony Siler (Glen Dale, WV)

Institution: West Virginia University
Field: Health Sciences (Psychology)
Faculty Advisor: Shafic Sraj

Office-Based Hand Surgery (OBHS) is gaining popularity compared to hand surgery done in the Operating room because of its convenience and cost benefits. Some patients are concerned about being awake during the surgery, however. Patient experience has not been previously assessed in OBHS and exploring expected and actual distress levels allows patients to make informed decisions regarding OBHS. The goal of this study is to assess patient distress levels starting at the time of surgical decision through the early recovery phase. We are in the process of recruiting 50-100+ patients to complete distress surveys prior to, during, and following OBHS. We are using the Amsterdam Preoperative Anxiety and Information Scale (APAIS) and Subjective Units of Distress/ Disturbance Scale (SUDS). We are applying SUDS to previously identified sources of distress including awareness, needle sticks, surgical pain, discomfort, and outcome. The secondary goal of this study is to identify patient variables that may contribute to an over prediction of distress, measured by the difference between pre- and post-operative distress scores. We predict an increasing level of distress up until the surgery, followed by a significant decline postoperatively once they realize how minimally invasive the surgery was. Understanding the patient experience will help surgeons gain knowledge about what causes patient distress in OBHS, develop screening tools for OBHS, and find methods to mitigate perioperative distress in OBHS.

Funding:

71. Following the Guidelines of COVID-19

Alyssa Settle (Alum Creek, West Virginia)

Institution: University of Charleston
Field: Social Sciences (Psychology)
Faculty Advisor: Michael Bayly

The present study intends to examine adherence to COVID-19 policies and is based on previous research that observed how fast-food workers practiced hand hygiene while an observer was present (Green et al, 2006). In the current time, hand hygiene is particularly important when dealing with COVID-19. The study will examine whether or not the University of Charleston students will follow schools COVID-19 guidelines. The primary hypotheses are that participants are more likely to follow the guidelines for Covid-19 if someone is watching, and participants will be less likely not to follow procedures when thinking someone is not watching. Participants (P's) will be observed to see if they are taking their temperature when enter a building, as dictated by the University of Charleston's COVID-19 policy. Participants will be observed at random. There are two conditions in this study, control and experimental. In the control group, the participants will be observed without seeing the researcher. The experimental condition requires the researcher or an authority figure, such as a staff member, to be seen. Participants in both conditions will not know they are being recorded. It is anticipated participants will be more likely to follow COVID-19 guidelines and take their temperature when they are aware of being watched than when they think no one is watching them. Through this study, the relevance to West Virginia is to get a better understanding of how the public can help stop the spread of COVID-19.

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Funding:

72. Analyzing parent characteristics and invalid responses on the Brief Child Abuse Potential Inventory

Samantha Holbert (Bridgeport, WV)
Serena Roberts (Baltimore, Maryland)
Miranda Signorelli (Hurricane, WV)

Institution: West Virginia University
Field: Social Sciences (Psychology)
Faculty Advisor: Cheryl McNeil

Child abuse is an extensive problem, affecting millions worldwide (Stoltenborgh et al., 2015). It is critical to understand parent-level factors associated with child abuse potential to inform effective prevention strategies. The widely-used Brief Child Abuse Potential Inventory (BCAP; Ondersma et al., 2005), which identifies parents at risk for child abuse, produces a "faking-good" score that indicates patterns of socially desirable responding (i.e., lying). Parents' responses are invalidated when this Lie score is elevated and have largely been excluded from current research. However, such responses identify a potentially critical subset of parents that may be at elevated risk for child abuse due to their efforts to portray themselves more positively. This study investigates key aspects of parenting stress and parent emotion regulation as they relate to differences between parents with valid and invalid BCAP responses.

In a sample of 84 caregiver-child dyads, parents with invalidated profiles ($n = 43$) had significantly higher risk for child abuse ($p < .001$) than those with valid responses ($n = 41$). Parents involved in a larger treatment study completed the Parenting Stress Index (PSI; Abidin, 2012), the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004), and the BCAP during the pre-treatment assessment. This study examines the under-researched invalid responses on the BCAP, parenting stress levels, and emotion regulation difficulties within this at-risk group of parents to enhance our understanding of why parents may perpetrate child abuse and to improve the utility of self-reported data on key parenting behaviors implicated in child abuse.

Funding:

73. "The Impact of Mental Health Awareness on Collegiate Athletes"

Sydney Philpott (Athens, West Virginia)

Institution: Concord University
Field: Health Sciences (Psychology)
Faculty Advisor: Laura Wamsley

Mental health is recognized as an important topic in the world today. Mental health includes our social, emotional and psychological wellbeing. A person's mental health plays a part in how we usually manage the stress we put on our bodies. As we begin to learn the importance of how we manage our mental health especially in times in times in which we live, it has never been as important as it is today. As we engage and involve ourselves in the world around us, the importance of physical and mental/emotional health has never been as important topic of discussion as it is now. However, as previously discussed before, the mental health crisis that is effecting our nation currently is something that must be addressed.

College athletes have expectations and stresses that can affect their mental health. This research specifically focuses on the stigmas of mental health in the athletic population. It addresses and discusses how stigmas affect athletes, specifically, in obtaining mental health resources and/or treatment. The question addressed is "Do collegiate athletes avoid seeking mental health services based on stigmas or preconceived thoughts?" While addressing those stigmas and preconceived thoughts, this study seeks to determine if stigmas or preconceived thoughts affects collegiate athletes in their decision whether to seek mental health services.

Funding:

74. Mortality Salience and Geographic Regions' Impacts on Perceptions of Racism

Heather Connery (Hurricane, WV)

Institution: University of Charleston
Field: Social Sciences (Psychology)
Faculty Advisor: Michael Bayly

The purpose of this study is to examine how mortality salience and the geographic location wherein participants were raised impacts what they view as racism. I hypothesize that participants who experience mortality salience (MS) will be more likely to rate only overt acts of racism as racist. Similarly, I hypothesize that participants who were raised in southern regions of the United States will be less perceptive of non-overt acts of racism. Hypotheses will be tested in a 2 (MS present, MS absent) by 3 (Ps from southern US, northern US, non-US) IV by PV factorial design. Ps will be randomly assigned to a MS condition, and after watching their respective PowerPoints, complete a questionnaire consisting of twenty scenarios varying in type of racism being portrayed (no racism, aversive racism, overt racism) and a short demographic form identifying race/ethnicity, sex, age, where they were raised, political affiliation, and religious background. In West Virginia, racism is still a heavily controversial topic and is experienced daily by many African Americans. Similarly, racial discrimination continues to be overwhelming problem in this state, with many persons not realizing they are behaving in a "racist" manner when using more aversive forms of racial discrimination. Perhaps the results of my study can provide insight into our behavior and help us begin the process of change.

Funding:

75. Qualitative and Quantitative Changes in Parental Verbalizations during PCIT for Children with Autism

Kelsey Keen (Harrisburg, PA)
Emily Lafferty (Spanishburg, WV)

Institution: West Virginia University
Field: Social Sciences (Psychology)
Faculty Advisor: Cheryl McNeil

Autism spectrum disorder (ASD) affects approximately 1 in 54 children across the country (CDC, 2020). Among children with ASD, 25% have a comorbid disruptive behavior disorder (Kaat & Lecavilier, 2013). Parent-Child Interaction Therapy (PCIT) is an evidence-based treatment for disruptive behaviors in young children (McNeil & Hembree-Kigin, 2010). Although originally designed to treat children with disruptive behavior disorders, there is a growing body of evidence that supports the use of PCIT for children with autism (Masse et al., 2016). In PCIT, parents are coached to follow their child's lead during play by using positive responsive verbalizations (e.g., labeled praises, reflections) and avoiding negative leading verbalizations (e.g., commands, criticism). Responsive parental verbalizations have been linked to long-term positive outcomes for children with autism, such as increases in joint attention and communicative skills (Siller & Sigman, 2002, 2008). The current study seeks to examine changes in the quality and quantity of parent verbalizations during PCIT within a community-based sample.

The study sample consisted of 10 parents and their children, all of whom had a diagnosis of autism spectrum disorder and were referred to a community-based clinic for PCIT. Parental verbalizations during a 5-minute free-play interaction were counted and coded using the Dyadic Parent-Child Interaction Coding System (Eyberg et al., 2013) at pre- and post-treatment. Paired t-tests will be used to examine pre-post differences in parent verbalizations and parent word count. The appropriateness of PCIT as a parent-mediated intervention to increase parental verbal responsiveness will be discussed.

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Funding:

76. Child Adversity and Perceived Stress in College Students: The Mediating Role of Emotion Regulation

Kailey Basham (Morgantown, WV)

Institution: West Virginia University
Field: Social Sciences (Psychology)
Faculty Advisor: Nicholas Turiano

Adverse childhood experiences (ACEs) represent the abuse, maltreatment or adversity children experience, and have been found to be associated with maladaptive psychological outcomes. The current study examined whether sub-optimal emotion regulation strategies mediated the association between ACEs and perceived stress. We hypothesized that those experiencing greater adversity would utilize more suppression techniques to deal with stressors, resulting in higher perceived stress scores. The sample consisted of 769 (M_{age} = 18; 50% female) freshman students from the College Student Transition Study. ACEs were quantified by 15 questions assessing emotional, physical, and sexual adversity during childhood. Emotional reappraisal and suppression strategies were measured via the emotion regulation questionnaire (Gross & John, 2003). Perceived stress was indexed by the perceived stress scale (Cohen, Kamarck & Mermelstein, 1983). Mediation analyses conducted in MPLUS software revealed that those experiencing greater childhood adversity had a significantly higher perceived stress score (b = .27; p < .05). Those experiencing greater childhood adversity were more likely to use suppression techniques (b = .13; p < .05) and fewer reappraisal techniques (b = -.17; p < .05). The use of suppression was significantly associated with greater stress (b = .17; p < .05) while the use of reappraisal was associated with less stress (b = -.35; p < .05). Indirect effects revealed significant indirect effects for both suppression (b = .85; p < .05) and reappraisal (b = -1.89; p < .05), suggesting that emotion regulation strategies do mediate the association between ACEs and perceived stress in this population.

Funding: National Institute of General Medical Sciences and Federal Work Study

77. Impact of Social Media on Mental Health Outcomes

Alysia Inosencio (Athens, WV)

Institution: Concord University
Field: Social Sciences (Psychology)
Faculty Advisor: Rodney Klein

Numerous studies have been conducted examining the effects of social media on a number of mental health outcomes, especially anxiety and depression (Hunt, Marx, Lipson, & Young, 2018; Kircaburun, Alhabash, Tosuntas, & Griffiths, 2018; Sacco, 2018; Stevens & Morris, 2007).
Escobar-Viera et. Al, (2018) reported that increased social media use, especially when categorized as passive social media use, leads to increased odds for severe depressive symptoms. It has also been reported that 90% of college students, age 18 to 29 years, use at least one social media site (Pew Research Center). The goal of my research is to show that with increased social media use, specifically problematic social media use, participants will show increased symptomatology of anxiety, depression, and other mental health outcomes. The current study comprised of 100 college students (50 females and 50 males) will examine the relationship between problematic social media use and increased negative mental health outcomes. The use of social media will be recorded by having participants take screenshots of their phones daily social networking and screen time averages. Outcomes will be measured using a variety of scales on anxiety, depression, Fear of Missing Out, self-esteem, and well-being. Results will be analyzed using multiple regression to demonstrate the relationship between social media use and various mental health measures. Results of the current study have applications to parent's limiting children's social media use and source of informing the public to its effects when overused.

Funding:

78. False Memories

Christopher Bowden (Nitro, WV)

Institution: University of Charleston
Field: Social Sciences (Psychology)
Faculty Advisor: Jason Newsome

The purpose of this study is to examine false memories and how time effects the rate in which an individual will recall a false memory. I hypothesize that individuals who are randomly assigned to watch the longer film will have the highest recall rate of false memories. While, the individual who are randomly assigned to the shorter film will have the lowest recall rate of false memories. Participants (Ps) will participate in the study as follows: Ps will read and sign consent forms at he beginning he the study, ensuring their informed consent to participate. Ps will then complete a short demographic form. Following the demographic, Ps will be randomly assigned to conditions and then will be shown a film that match their assigned condition. Conditions will be determined by the length of the film (3 minutes or 10 minutes). The film will be self-recorded and held constant throughout all conditions in the study. This will be a two group independent measures post-test only design. Ps will then be instructed to complete a crossword puzzle in which will act as a distraction test. Ps will then answer a short questionnaire regarding the film that the Ps have watched. Ps will then be debriefed and thanked for their participation in the study. In West Virginia, false memories are found in many eyewitness testimonies in which can influence the outcome of a criminal case. Perhaps the results of my study can provide insight into the construct of false memories.

Funding:

79. Improving Child Emotion Regulation and Development Through Emotion Labeling and Parent-Child Interaction Therapy-Toddler

Sophia Shank (Morgantown, WV)
Grace Berkmeyer (Mason, OH)

Institution: West Virginia University
Field: Social Sciences (Psychology)
Faculty Advisor: Christopher Owen

Accurate and non-judgemental emotion validation help children better accept emotions and learn to validate others emotions (Lambie et al., 2020). Importantly, children's emotional skills are influenced early in childhood by caregivers-child interactions. The study will investigate emotion labeling; specifically the construct validity, coding reliability, frequency, and associations with treatment variables.

The parent study was a randomized controlled trial investigating the efficacy of Parent-Child Interaction Therapy with Toddlers (PCIT-T) in young children aged 14- to 24-months in Sydney, Australia that were referred for treatment of behavior problems. Emotion labeling is a positively spoken observation of emotion, feeling, or state of being given by the caregiver about the child. Participants received 16 hours of PCIT-T intervention. A behavioral outcome monitoring assessment was collected at pre-, post-, and follow-up treatment. The present study will transcribe and code 50 caregiver-child dyads using the Dyadic Parent-Child Interaction Coding System (DPICS). Emotion labeling will be operationalized after a review of the literature to ensure strong construct validity.

Descriptive analyses will be conducted to explore the frequency of emotion labeling in the sample of caregiver-child dyads enrolled in a randomized-controlled trial in Australia. Moreover, a correlation matrix will be run to explore associations with demographic, treatment, and other DPICS variables. Effective emotion labeling can encourage expressive language, improving the child's identification and expression of future emotions (Girard, 2020).

Funding: Liverpool Catholic Club Grant

80. Nova Symbiosis: Evolutionary Psychology & Social Media Dependency

Brandon Dolly (Kearneysville, West Virginia)

Institution: Shepherd University
Field: Education (Pyschology)
Faculty Advisor: Dawne Burke

The principal focus behind this research project was to descriptively explore evolutionary psychology, as it relates to social psychology and the current sociological phenomenon commonly referred to as: social media platforms. Was it possible that such platforms fundamentally alter brain chemistry at the organismic level? Such synaptic, chemical disturbance is perhaps associated with the human condition's ability, or converse inability to realize *self-actualization* (Maslow, 1954). Based on a *Pew Research Center* (2018) survey of social media usage, the number of Americans consistently active on social media platforms exponentially increases each year.

As such, the neurological effects evident from increasing attachments to social media, particularly the functions of the mesocortical, nigrostriatal, and mesolimbic dopamine pathways associated with neurological development are symptomatically equivalent with highly addictive drugs, such as heroine and oxycodone along the synaptic dopamine pathways (Haynes, 2018). A key idea expressed within evolutionary psychology is that no human behavior arises by accident, for among evolutionary psychologists, behaviors are indicative of Darwinian ideology since behaviors are understood, as learned survival instincts at the genomic level: Inheritable gene transfer (Davis, 2019; Darwin, 1859).

This formative exploration highlights connections between (a) social media, (b) self-sexualization, and (c) evolutionary psychology in an effort to provide for <u>*other*</u> kinds of pathways that perhaps might deter dependency and lead to productive discussions for how these three qualities delay self-actualization acquisitions at the most rudimentary level.

Funding:

81. Assessing Risk Factors of Sexual Assault Victimization on College Campuses

Wren King (Morgantown, WV)

Institution: West Virginia University
Field: Social Sciences (Sociology/Social Work)
Faculty Advisor: Lindsay Kahle

On average of 20% to 25% of women and 6% of men in college will experience some form of sexual assault. Research focusing on college campus sexual assault often focuses on how social context plays a role in assault prevention, yet few studies have focused on identity factors in this context. We seek to consider this issue, and in order to do that, we utilize the Campus Climate Survey, conducted by the Association of American Universities. The data was collected using a web-based survey, between April and May 2015, at 27 universities across the US. The total sample included 150,380 undergraduate, graduate, and professional students. A series of logistic regressions were utilized to test several factors, including age, classification, and sex on victimization, with specific focus on the intersections of gender, sexual orientation, race, and ethnicity. Results show that citizenship, disability, females or LGBQ+ identities, women of color, and campus climate all contribute to higher odds of experiencing sexual assault. There is little to no research on victimization of international students and students with registered disabilities, but our findings show that it is an issue that must be addressed as these individuals are not being well served by their institutions. Implications are discussed within the context of West Virginia and the nation at large.

Funding: Summer Undergraduate Research Experience (SURE) / Division of Science & Research HEPC

82. Effects of Afrocentric Hair on Personal Identity and Professional Experience

Nadia Johnson (Anawalt, WV)

Institution: Concord University
Field: Social Sciences (Sociology/Social Work)
Faculty Advisor: Kathryn Nutter-Pridgen

Afrocentric hair has long been looked at as an unacceptable way for Black women to wear their hair. Afrocentric hair is considered curly and coily often times worn in an afro a puff, or in its natural state. Women have been oppressed for years by not being allowed to do the things that men are allowed to do. As many of those things have changed, discrimination towards women, especially Black women, still continues. Afrocentric hair, body type and shape, and skin color have caused Black women to be discriminated against even more. These things have caused Black women to miss out on job opportunities, promotions, college enrollments and has also affected their mental health. Many Black women suffer with self-esteem issues, insecurities, and living a double life. Black women often times live a life that portrays one thing to the particular audience that they are with at that given time. Through this paper, evidence from interviews with Black female professionals will be provided to help understand some of the effect of Afrocentric hair towards Black women. Previous research that was conducted to discuss these effects and how they have shaped the mind of Black women will be included, as well.

Keywords: colorism, race-based discrimination, hair discrimination, race-related stress

Funding: McNairs Scholars