17th Annual
UNDERGRADUATE RESEARCH DAY
at the Capitol

2.7.2020

WEST VIRGINIA STATE UNIVERSITY 1891

MARSHALL

West Virginia University

UC UNIVERSITY OF CHARLESTON

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

House #	Participant		Poster #
1	Torey	Wright	6
3	Morgan	Glass	4
4	Sarah	Starcovic	28
5	Benjamin	Day	41
	Jacqueline	Brown	44
8	Shyann	Stewart	11
	Bethany	Wager	67
9	Savannah	Hays	87
10	Noah	Collie	8
	Allison	Jones	18
	Rachel	Minney	26
	Rebecca	Kaminski	32
	Morgan	Perrone	47
	Josie	Hayma	48
	Bradley	Harrison	49
	Rachel	Richards	50
	Austin	Yeater	58
12	Grant	DuVall	33
13	Alyssa	Rittinger	38
15	Meredith	Phillips	21
	Vijaya Lakshmi Sundaram		22
	Sierra	Rabel	53
	Shelby	Bayliss	82
	Sarah	Lipinski	85
	Julie	Gilmore	86
	Heather	Connery	93
16	Macaela	Barnett	3
	Ian	Waddell	5
	Coy	Smith	27
	Hwapyeong	Song	42
	Jacob	Gressang	43
	Angelica	Stendardo	53
.	Olivia	Rogers	65
17	Jayden	Creasey	40
	James	Farley	45
18	Ellie	White	2

2020 Abstract Book Cover Credit: Anthony McGriff and Josh Martin

19	Chloe'	Marcum	77
20	Evan	Allen	65
	Walter	Warden	84
	Hayley	Haynes	94
23	Carlie	Ramsayer	61
	Jeffery	Adkins	80
27	Edith	Martinez	54
	Dakota	Miller	55
	Sophie	Klein	70
.	Eden	Riggs	84
29	Hailey	Brooks	7
	Faith	Kidd	30
30	Dalton	Grissel	57
31	Levi	Phillips	24
32	Emily	Keeney	1
34	Brian	Moore	16
	Preston	Allison	17
35	Hannah	Hudson	13
	Chinyere	Ugwuanyi	14
	Christopher	Bias	25
	Jordan	Nistendirk	73
36	Samantha	Belcher	12
	Jarred	Carter	46
	Molly	Plante	75
	Alex	Deardorff	76
38	Samantha	White	15
	Kingsly	Jonathan	20
39	Zachary	Blake	10
40	Katherine	Allen	72
41	Brooklyn	Butcher	6
43	Lindsey	Hartzell	66
48	Madewa	Adeniyi	19
	Samuel	Talkington	62
	Sara	Moreno	69
	Samantha	Holbert	88
51	David	Sokolov	9
	Matthew	Young	31
	Emily	Longerbeam	35
	Fiona	Galley	37

	Trevor	Brison		59
	Sara	Kuberski		68
	Sloan	Nesbit		75
	Caitlyn	Lyons		81
	Liam	McCabe		89
	Madeline	Price		90
	Sarah	Segear		91
	Colter	Uscola		96
58	Matthew	Chapman		29
59	Jessica	Hogbin		72
60	Serenity	McDill		36
65	Abby	Sims		79

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

Senate #	Participant		Poster # _ _
1	Morgan	Glass	4
2	Brian	Moore	16
	Sarah	Starcovic	28
	Matthew	Young	31
	Fiona	Galley	37
	Trevor	Brison	59
	Torey	Wright	62
	Sara	Kuberski	68
	Caitlyn	Lyons	81
	Liam	McCabe	89
	Madeline	Price	90
	Sarah	Segear	91
	Colter	Uscola	96
3	Noah	Collie	8
	Allison	Jones	18
	Rachel	Minney	26
	Rebecca	Kaminski	32
	Morgan	Perrone	47
	Josie	Hayma	48
	Bradley	Harrison	49
	Rachel	Richards	50
	Austin	Yeater	58
	Bethany	Wager	67

	Savannah	Hays		87
4	Meredith	Phillips		21
	Vijaya Lakshmi Sundaram			22
	Shelby	Bayliss		82
	Sarah	Lipinski		85
	Julie	Gilmore		86
	Heather	Connery		93
5	Ellie	White		2
	Macaela	Barnett		3
	Ian	Waddell		5
	Coy	Smith		27
	Hwapyeong	Song		42
	Jacob	Gressang		43
	James	Farley		45
	Angelica	Stendardo		53
	Olivia	Rogers		63
.	Chloe'	Marcum		77
6	Edith	Martinez		54
	Dakota	Miller		55
	Evan	Allen		64
	Sophie	Klein		69
	Walter	Warden		83
	Eden	Riggs		84
	Hayley	Haynes		94
7	Carlie	Ramsayer		60
	Jeffery	Adkins		79
8	Zachary	Blake		10
	Hannah	Hudson		13
	Christopher	Bias		25
	Alyssa	Rittinger		38
	Sierra	Rabel		52
	Katherine	Allen		71
9	Hailey	Brooks		7
	Levi	Phillips		24
	Faith	Kidd		30
	Dalton	Grissel		57
10	Emily	Keeney		1
11	Brooklyn	Butcher		6
	Lindsey	Hartzell		66
12	Preston	Allison		17

	Madewa	Adeniyi	19
	Grant	DuVall	33
	Samuel	Talkington	61
	Sara	Moreno	69
	Samantha	Holbert	88
13	David	Sokolov	9
	Emily	Longerbeam	35
	Sloan	Nesbit	75
15	Matthew	Chapman	29
	Serenity	McDill	36
	Jessica	Hogbin	72
	Abby	Sims	78
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	Samantha	Belcher	12
	Chinyere	Ugwuanyi	14
	Samantha	White	15
	Kingsly	Jonathan	20
	Jayden	Creasey	43
	Jarred	Carter	46
	Jordan	Nistendirk	73
	Molly	Plante	74
	Alex	Deardorff	76

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

State/Country	Participant		Poster #
MD	Alexandra	Collins	81
	James	Joyner	92
OH	Grace	Martin	52
.	Kylie	Sharp	39
PA	Rebekah	Kroeze	34
	Abigail	Paul	65
.	Riley	Darragh	95
VA	Chere	Davis	23
	Kate	Kessler	57

IV. PARTICIPANTS BY FIELD (first authors only)

Agriculture			Poster #
	Emily	Keeney	1
Astronomy			Poster #

Ellie	White	2

Biochemistry		Poster #
Macaela	Barnett	3
Morgan	Glass	4
Ian	Waddell	5

Biology		Poster #
Brooklyn	Butcher	6
Hailey	Brooks	7
Noah	Collie	8
David	Sokolov	9
Zachary	Blake	10
Shyann	Stewart	11
Samantha	Belcher	12
Hannah	Hudson	13
Chinyere	Ugwuanyi	14
Samantha	White	15
Brian	Moore	16
Allison	Jones	17
Preston	Allison	18

Biomedical		Poster #
Madewa	Adeniyi	19
Kingsly	Jonathan	20
Meredith	Phillips	21
Vijaya Lakshmi Sundaram		22
Chere	Davis	23

Chemistry		Poster #
Levi	Phillips	24
Christopher	Bias	25
Rachel	Minney	26
Coy	Smith	27
Sarah	Starcovic	28
Matthew	Chapman	29
Faith	Kidd	30
Matthew	Young	31

Community Health		Poster #
Rebecca	Kaminski	32
Grant	DuVall	33
Rebekah	Kroeze	34
Emily	Longerbeam	35
Serenity	McDill	36
Fiona	Galley	37
Alyssa	Rittinger	38
Kylie	Sharp	39

Computer Science		Poster #
Jayden	Creasey	40
Benjamin	Day	41

Hwapyeong	Song		42
Jacob	Gressang		43
Jacqueline	Brown		44
James	Farley		45
Jarred	Carter		46

Criminal Justice			Poster #
Morgan	Perrone		47
Josie	Hayma		48
Bradley	Harrison		49
Rachel	Richards		50
Grace	Martin		51
Sierra	Rabel		52
Angelica	Stendardo		53
Edith	Martinez		54

Ecology			Poster #
Dakota	Miller		55

Education			Poster #
Kate	Kessler		56

Engineering			Poster #
Dalton	Grissel		57
Austin	Yeater		58
Trevor	Brison		59
Carlie	Ramsayer		60
Samuel	Talkington		61
Torey	Wright		62
Olivia	Rogers		63
Evan	Allen		64

Environmental Studies			Poster #
Abigail	Paul		65
Lindsey	Hartzell		66
Bethany	Wager		67

Forensic Science			Poster #
Sara	Kuberski		68
Sara	Moreno		69

Geography			Poster #
Sophie	Klein		70

Geology			Poster #
Katherine	Allen		71

History			Poster #
Jessica	Hogbin		72
Jordan	Nistendirk		73
Molly	Plante		74

Immunology and Medical Micobiology			Poster #
Sloan	Nesbit		75

Material Science			Poster #

Alex	Deardorff	76

Mathematics	Poster #
Chloe' Marcum	77

Neuroscience	Poster #
Abby Sims	78
Jeffery Adkins	79
Alexandra Collins	80

Physical Activity and Sports Sciences	Poster #
Caitlyn Lyons	81

Political Science	Poster #
Shelby Bayliss	82
Walter Warden	83

Psychology	Poster #
Eden Riggs	84
Sarah Lipinski	85
Julie Gilmore	86
Savannah Hays	87
Samantha Holbert	88
Liam McCabe	89
Madeline Price	90
Sarah Segear	91
Heather Connery	93
Hayley Haynes	94
James Joyner	92

Sociology/Social Work	Poster #
Riley Darragh	95
Colter Uscola	96

V. PARTICIPANTS BY BROAD CATEGORY (first authors only)

Education	Poster #
Bradley Harrison	49
Kate Kessler	56

Engineering	Poster #
Emily Keeney	1
Madewa Adeniyi	19
Meredith Phillips	21
Jacob Gressang	43
Jacqueline Brown	44
Dalton Grissel	57
Austin Yeater	58
Trevor Brison	59
Carlie Ramsayer	60
Samuel Talkington	61
Torey Wright	62
Olivia Rogers	63
Evan Allen	64

Alex	Deardorff	76
Alexandra	Collins	80

Health Sciences		Poster #
Hailey	Brooks	7
Kingsly	Jonathan	20
Vijaya Lakshmi Sundaram		22
Rebecca	Kaminski	32
Grant	DuVall	33
Rebekah	Kroeze	34
Serenity	McDill	36
Fiona	Galley	37
Alyssa	Rittinger	38
Kylie	Sharp	39
Sloan	Nesbit	75
Abby	Sims	78

Humanities		Poster #
Jessica	Hogbin	72
Jordan	Nistendirk	73
Molly	Plante	74
Caitlyn	Lyons	81

Sciences		Poster #
Ellie	White	2
Macaela	Barnett	3
Morgan	Glass	4
Ian	Waddell	5
Brooklyn	Butcher	6
Noah	Collie	8
David	Sokolov	9
Zachary	Blake	10
Shyann	Stewart	11
Samantha	Belcher	12
Hannah	Hudson	13
Chinyere	Ugwuanyi	14
Samantha	White	15
Brian	Moore	16
Preston	Allison	17
Allison	Jones	18
Chere	Davis	23
Levi	Phillips	24
Christopher	Bias	25
Rachel	Minney	26
Coy	Smith	27
Sarah	Starcovic	28
Matthew	Chapman	29
Faith	Kidd	30
Matthew	Young	31

Emily	Longerbeam	35
James	Farley	45
Dakota	Miller	55
Abigail	Paul	65
Bethany	Wager	67
Sara	Kuberski	68
Sara	Moreno	69
Sophie	Klein	70
Katherine	Allen	71
Chloe'	Marcum	77
Jeffery	Adkins	79

Social Sciences		Poster #
Eden	Riggs	84
Morgan	Perrone	47
Josie	Hayma	48
Rachel	Richards	50
Grace	Martin	51
Sierra	Rabel	52
Angelica	Stendardo	53
Edith	Martinez	54
Lindsey	Hartzell	66
Shelby	Bayliss	82
Walter	Warden	83
Sarah	Lipinski	85
Julie	Gilmore	86
Savannah	Hays	87
Samantha	Holbert	88
Liam	McCabe	89
Madeline	Price	90
Sarah	Segear	91
James	Joyner	92
Heather	Connery	93
Hayley	Haynes	94
Riley	Darragh	95
Colter	Uscola	96

Technology		Poster #
Benjamin	Day	41
Hwapyeong	Song	42
Jarred	Carter	46

VI. PARTICIPANTS BY INSTITUTION (first authors only)

Concord University		Poster #
Faith	Kidd	30
Edith	Martinez	54
Dakota	Miller	55
Sophie	Klein	70

Eden	Riggs	84
Hayley	Haynes	94

Davis and Elkins College		Poster #
Matthew	Chapman	29

Fairmont State University		Poster #
Sarah	Starcovic	28
Walter	Warden	83

Glenville State College		Poster #
Brian	Moore	16
Preston	Allison	17
Chere	Davis	23

Marshall University		Poster #
Ellie	White	2
Macaela	Barnett	3
Ian	Waddell	5
Vijaya Lakshmi Sundaram		22
Coy	Smith	27
Benjamin	Day	41
Hwapyeong	Song	42
Jacob	Gressang	43
Jacqueline	Brown	44
James	Farley	45
Jarred	Carter	46
Angelica	Stendardo	53
Olivia	Rogers	63
Evan	Allen	64
Sara	Moreno	69
Katherine	Allen	71
Chloe'	Marcum	77

Ohio Valley University		Poster #
Rebecca	Kaminski	32
Morgan	Perrone	47
Josie	Hayma	48
Bradley	Harrison	49
Rachel	Richards	50
Abby	Sims	78

Shepherd University		Poster #
Kate	Kessler	56
James	Joyner	92

University of Charleston		Poster #
Zachary	Blake	10
Allison	Jones	18
Levi	Phillips	24
Shelby	Bayliss	82
Heather	Connery	93

West Virginia State University		Poster #
Shyann	Stewart	11
Samantha	Belcher	12
Hannah	Hudson	13
Chinyere	Ugwuanyi	14
Samantha	White	15
Christopher	Bias	25
Rachel	Minney	26
Jayden	Creasey	40
Grace	Martin	51
Sierra	Rabel	52

West Virginia University		Poster #
Morgan	Glass	4
Noah	Collie	8
David	Sokolov	9
Madewa	Adeniyi	19
Kingsly	Jonathan	20
Meredith	Phillips	21
Matthew	Young	31
Grant	DuVall	33
Rebekah	Kroeze	34
Emily	Longerbeam	35
Serenity	McDill	36
Fiona	Galley	37
Alyssa	Rittinger	38
Kylie	Sharp	39
Trevor	Brison	59
Carlie	Ramsayer	60
Samuel	Talkington	61
Torey	Wright	62
Abigail	Paul	65
Lindsey	Hartzell	66
Bethany	Wager	67
Sara	Kuberski	68
Jessica	Hogbin	72
Jordan	Nistendirk	73
Molly	Plante	74
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Alex	Deardorff	76
Jeffery	Adkins	79
Alexandra	Collins	80
Caitlyn	Lyons	81
Sara	Lipinski	85
Julie	Gilmore	86
Savannah	Hays	87
Samantha	Holbert	88

Liam	McCabe	89
Madeline	Price	90
Sarah	Segear	91
Riley	Darragh	95
Colter	Uscola	96

West Virginia University Institute of Technology		Poster #
Emily	Keeney	1
Brooklyn	Butcher	6
Hailey	Brooks	7
Dalton	Grissel	57
Austin	Yeater	58

Capitol Rotunda Layout, 2020 Undergraduate Research Day at the Capitol

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1 3 5 7 9 11 13 15 17 19 21 23
2 4 6 8 10 12 14 16 18 20 22 24

25 27 29 31 33 35 37 39 41 43 45 47
26 28 30 32 34 36 38 40 42 44 46 48

97 98

99 100

50 52 54 56 58 60 62 64 66 68 70 72
49 51 53 55 57 59 61 63 65 67 69 71

74 76 78 80 82 84 86 88 90 92 94 96
73 75 77 79 81 83 85 87 89 91 93 95

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Hallway between the two rooms
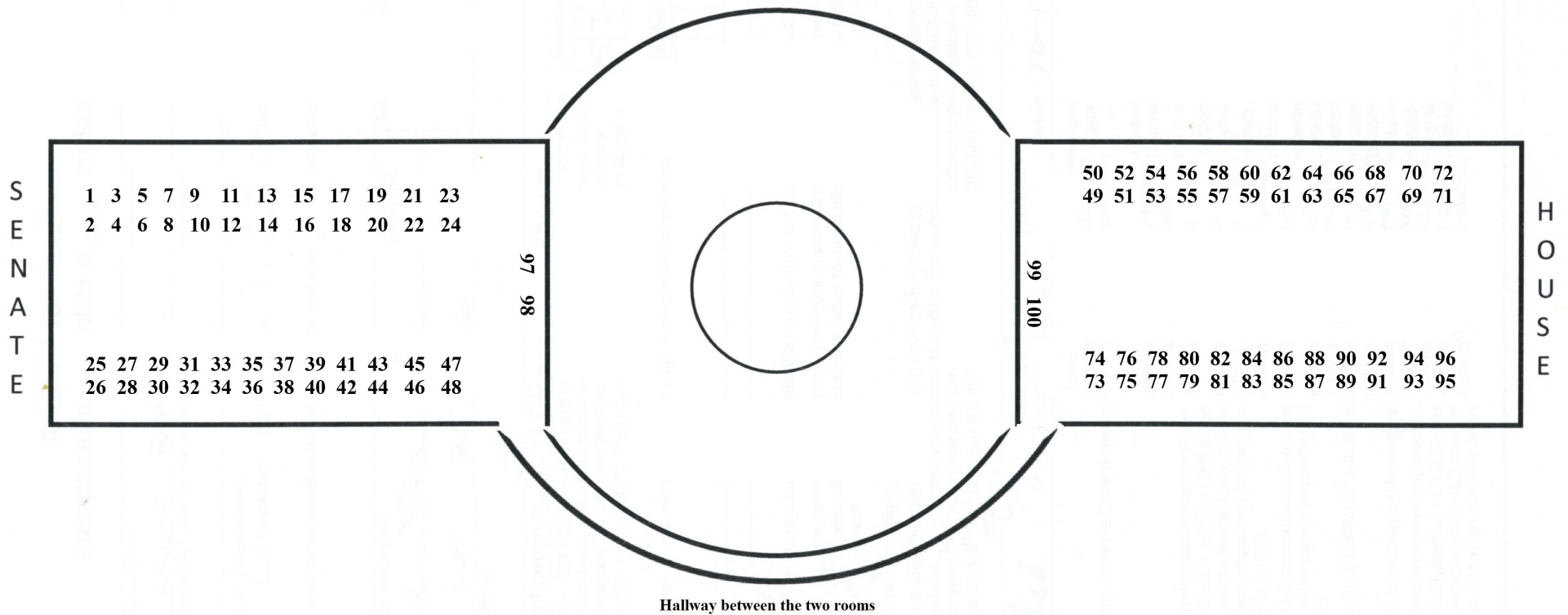
1. Automatic Cattle Birth Assist Device (Automatic Calf-Puller)

Emily Keeney (Rainelle, WV)
Tyler Vandall (Shady Spring, WV)
Nicholas Kennedy (Sophia, WV)

Institution: West Virginia University Institute of Technology
Field: Other (Agriculture)
Faculty Advisor: Dr. William Church

Today, America's farmers make up less than 2% of the population, averaging 58 years old. Though able-bodied beings, these individuals have more difficulty with this demanding lifestyle. Many farmers operate their farm individually. Farm work is especially difficult during calving season. Difficult calving requires assistance and strength to correct a stuck calf and usually the aid of a calf puller is required. This device requires two operators. One person attends to the calf and the breechen, (positioned against the cow), while the other holds the end of the pole and cranks the calf out via straps on its legs, wedging the calf out of the birth canal.

The purpose of this project is to automate this device, making it easier to be used by one person. This device will use an Arduino and a load cell to work with the cow's natural contractions to gently pull the calf out of the birth canal. The load cell is positioned between the calf and an electrical winch by joining the cable from the winch's wire spool to the calf's front legs. It will sense when there is no tension on the wire, which will be the moment when the cow is contracting. The load cell will send a signal through the breakout board, to the Arduino, activating the winch to retract the slack. It will then stop the winch when the cow's contractions stop. This will be a better alternative than the current process of using a 4-wheeler's winch or other means.

2. Acquiring Radio Sky Data to Train Machine Learning-Based Detection Algorithms for Research in Cosmology

Ellie White (Barboursville, WV)

Institution: Marshall University
Field: Sciences (Astronomy)
Faculty Advisor: Richard Bradley

Strong galactic foreground emissions make it challenging for astronomers to detect the faint signature of neutral hydrogen (HI) from the Dark Ages of the Universe. The ground-based Cosmic Twilight Polarimeter (CTP) and the Dark Ages Polarimeter Pathfinder (DAPPER, a NASA mission concept for an instrument which will be launched into lunar orbit) are projects which will make use of the newly-developed dynamic polarimetry method to subtract foreground emissions out of cosmological HI measurements. In order to implement dynamic polarimetry in the CTP and DAPPER's data pipelines, machine learning techniques will be used to create sky models of the galactic foreground. The goal of this summer's project was to commission a radio telescope system to obtain observations of the galactic foreground for use in machine learning training sets. To achieve this, a disused antenna element from a decommissioned project was refurbished, a backend data analysis system was developed, and post-processing programs were written to enable the collection of sky data from the antenna's deployment site at the Green Bank Observatory. The CTP and DAPPER project teams will utilize the data collected by this antenna to create machine-learning sky models to extract the cosmologically-significant HI signal using dynamic polarimetry.

3. The effect of moderate alcohol on the function of the Na-K-ATPase in intestinal epithelial cells

Macaela Barnett (Huntington, WV)

Institution: Marshall University
Field: Sciences (Biomedical Science)
Faculty Advisor: Soudamani Singh

Background: In West Virginia, excessive alcohol consumption annually costs the state 1.1 billion dollars in productivity and healthcare costs, including costs associated with chronic alcoholics who are commonly malnourished. This malnutrition is in part due to alcohol's inhibitory effect on nutrient absorption along the small intestine. The proper absorption of nutrients relies on specific sodium-dependent transporters in the brush border membrane (BBM) of intestinal epithelial cells, and these transporters are known to be inhibited by alcohol. The Na-K-ATPase, located on the basolateral membrane of intestinal epithelial cells, provides the sodium gradient required for the function of BBM sodium-dependent nutrient transporters. However, how ethanol inhibits the Na-K-ATPase is unknown. **Hypothesis:** Moderate ethanol inhibits the Na-K-ATPase. **Aim:** Determine the mechanism by which ethanol alters the Na-K-ATPase. **Methods:** Rat intestinal epithelial cells (IEC-18) were exposed to moderate ethanol (8.68 mM) for one hour. Na-K-ATPase activity was determined as a measure of ^{86}Rubidium uptake. Protein expression of Na-K-ATPase alpha-1 and beta-1 subunits were measured with Western blot. **Results:** Moderate ethanol significantly inhibited the activity of the Na-K-ATPase at one hour (1070 ± 10.1 pmol/mg protein●min in controls vs 603 ± 122 in ethanol-treated cells, $p<0.05$, n=3). The protein expression of the alpha-1 subunit did not change, but the expression of beta-1 was decreased. **Conclusions:** Moderate ethanol inhibits Na-K-ATPase activity and decreases protein expression of beta-1, which is important for proper trafficking of the alpha-1 subunit of the Na-K-ATPase to the membrane. The diminished sodium-gradient contributes to the inhibition of sodium-dependent nutrient absorption and malnutrition present in chronic alcoholics.

4. Picking favorites: Differential activation of phosphofructokinase-1 by biphosphorylated sugars

Morgan Glass (Triadelphia, WV)

Institution: West Virginia University
Field: Sciences (Biochemistry)
Faculty Advisor: Bradley Webb

Diseases related to dysregulated glucose metabolism, including diabetes, neurological disease, and cancer, negatively impact the lives of West Virginians. Despite decades of studying dysregulated glucose metabolism, there still exists gaps in our understanding of the molecular mechanisms leading to initiation and development of these diseases. Our research focuses on "the gatekeeper" of glycolysis, Phosphofructokinase-1 (PFK-1), the enzyme catalyzing the step committing glucose to breakdown. We ask how regulation of PFK-1 by different metabolites affects the processing of glucose, specifically regarding biphosphorylated sugars. Fructose-2,6-bisphosphate (F2,6bP) is a strong allosteric activator of PFK-1 while the structurally related fructose-1,6-bisphosphate (F1,6bP), a product of the enzymatic reaction, can only activate the muscle isoform of PFK-1. We sought to determine this unique molecular mechanism by which the enzyme can discern between these sugars that are so similar at the molecular level. After structural examination of the allosteric binding site, we predicted the presence of a cysteine helps allow this differential identification. To test this hypothesis, we are currently creating a mutant of PFK-1 that we predict to increase the enzyme's ability to differentiate these sugars and therefore only show strong activation with F2,6bP. Future studies include activity testing of the mutant PFK-1 and structural studies of the enzymes bound to each sugar. Together, these studies will determine how PFK-1 is activated by biphosphorylated sugars. Our research into this critical enzyme of glycolysis bolsters our understanding of human glucose processing; it holds potential to contribute toward innovation of new therapies addressing diseases involving dysregulated glucose metabolism.

5. A Novel Colorimetric Assay for Measuring Beta-Lactam Hydrolysis

Ian Waddell (Milton, WV)

Institution: Marshall University
Field: Sciences (Biochemistry)
Faculty Advisor: Menashi Cohenford

This project presents a novel procedure for assaying the extent of β-lactamase-mediated mitigation of β-lactam antibiotics. β-lactam antibiotics are a common antibiotic class containing a β-lactam ring, a structure that inhibits synthesis of the bacterial cell wall and leaving the bacterium vulnerable. Some bacterial strains have evolved a class of enzymes known as β-lactamases, which catalyze the conversion of β-lactam rings to inactive metabolites, yielding antibiotic resistance. It has been shown in previous research that these inactive metabolites can reduce cupric (Cu^{2+}) ions to cuprous (Cu^+) ions in solution. Using this, the analytic method described here combines bathocuproinedisulfonic acid disodium salt, a bidentate ligand, and anhydrous copper (II) sulfate to generate a highly sensitive color reagent that forms a color complex when the cupric ions are reduced in the presence of inactive β-lactam metabolites. This color complex has been shown to form in the presence of inactivated β-lactam antibiotics under both enzymic and non-enzymic conditions. Additionally, the color complex possesses a sensitivity for each of the tested antibiotics and shows direct linear proportionality between metabolite concentration and complex absorbance. This assay was also used to assess the kinetic parameters of a β-lactamase isolated from *Bacillus cereus*. This research aims to aid medical practitioners in recognizing resistant bacterial strains and diagnosing and treating bacterial infections accordingly.

6. Identification of Potential Probiotics that Antagonize Human Pathogens

Brooklyn Butcher (Mount Nebo, WV)
Seth Conley (Summersville, WV)

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

Several human diseases are caused by bacterial infections. We call the bacteria that cause disease by the term pathogenic bacteria. Traditionally antibiotics have served as the first defense against many of these pathogens that cause disease. Unfortunately, many of the pathogens are becoming resistant to antibiotic treatment. A probiotic is a living organism that is used for some benefit. Many probiotics are themselves bacteria, but rather than being harmful they are a species or strain that is beneficial. It has been shown that probiotics can be useful in treating many diseases. Probiotics can be used to create a good flora of bacteria making it harder for pathogenic bacteria to survive. If this is the case the probiotic bacteria are termed to be antagonistic against the pathogens. The purpose of this current study was to isolate bacteria from novel sources to determine whether they could be antagonistic against specific pathogens. Antagonism assays were performed against eight human pathogens. Several novel isolates were found to antagonize and prevent growth of many human pathogens including those that cause skin and respiratory infections. Select isolates were identified via 16S genetic sequencing. Novel strains of *Pseudomonas fluorescens* and *Bacillus mycoides* were two of the isolates determined to prevent growth of several human pathogens. These isolates have the potential to serve as novel probiotics in preventing and treating infections caused by several human pathogens.

7. Testing effects of skin care through means of an in vitro grown model skin

Hailey Brooks (Crab Orchard, WV)

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

The natural skin microbiome is important to maintaining healthy skin. The goal of this study is to examine effects that over-the-counter skin care products have on skin microbes, as well as the skin itself. The chosen method for testing skin *in vitro* is growing a living skin model using a Transwell culture system. One drawback to this traditional cell culture system is that cells grow on a flat surface that does not resemble a natural skin landscape. To create a more realistic skin structure and niche for skin bacteria, a textured 3D-printed mold is being developed for forming the bottom skin layer out of proteins that can be transferred into each well of the Transwell system. Once this stable, bottom protein layer is in place, human skin cells can be applied and grown until a solid patch of layered skin is formed. Once viable skin is ready, it will be co-cultured with skin bacteria and washed with various over-the-counter skin care products. Following washing, numbers of bacteria recovered and effects on bacteria growth and function can be evaluated. Furthermore, the skin cells can be evaluated for damage and changes to their growth and interaction with bacteria. Because there seems to be a lack of information regarding skin models and bacterial growth, this skin model could potentially open many more doors of study and applications.

8. Phenomic and Genetic Variation Associated with Drought Stress, Recovery, and Memory in *Sorghum bicolor*

Noah Collie (Washington, WV)
Emmelia Braun (Hurricane, WV)

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

Drought is becoming more prevalent due to increases in global temperatures and fluctuations in precipitation brought on by climate change. These changes are negatively affecting the yield of staple cereal crops, ultimately reducing yield. *Sorghum bicolor,* a drought acclimated cereal crop*,* is an ideal model to study the effects of drought on agronomic traits, and further, to discover mechanisms of drought recovery and memory. In this experiment, two accessions of *S. bicolor*, which exhibit different drought responsive phenotypes, were exposed to cyclical watering regimes, mimicking periods of drought with intermittent rainfall. Each accession was exposed to one of three cyclical drought treatments, and phenotypic measurements were taken during both plant stress and recovery phases. Changes in expression of known drought-responsive genes were determined for all watering regimes, at all time-points, and in three plant tissues, allowing for the initiation of the stress recovery/stress memory mechanisms to be evaluated. Given the negative impact of drought on agriculture, it is imperative to identify mechanisms of drought tolerance in crop plants, specifically those that maintain grain yield, in order to ensure food quality, availability, and affordability. For example, grain yield is estimated to decrease by ~1.5% over the next decade due to drought, causing the price of grain-based products to increase, further burdening those already facing economic hardships. This issue hits close to home for those living in the Mountain State, given that 17.8% of West Virginia's population lives in poverty, making the elucidation of drought-responsive phenotypes increasingly important.

9. NMNAT1, a protein linked to blinding disease, is crucial for development of the retina

David Sokolov (Morgantown, WV)

Institution: West Virginia University
Field: Sciences (Biology)
Faculty Advisor: Saravanan Kolandaivelu

Humans are primarily visual creatures; we're able to see due to a thin tissue in the back of the eye called the retina. The retina is a highly organized structure made of different classes of specialized cells, which work in tight coordination to collect and process light signals before sending these signals to the brain. The biological processes within the retina are incredibly fine-tuned—small defects in any of these processes can disrupt the system, leading to blindness. Our study focuses on one of the proteins in the retina called NMNAT1. Mutations in NMNAT1 are associated with Leber's Congenital Amaurosis, which is one of the most prevalent childhood blinding diseases. There is evidence that NMNAT1 plays an especially important role in the health of the retina, but this role is not well understood. To fill this knowledge gap, we genetically removed NMNAT1 from the retina of mice and documented what happens in the absence of this protein. Using this approach, we found that NMNAT1 is crucial for the proper late-stage development of the retina, most likely through its involvement in retina-specific gene regulation and metabolism. We also found that the central portion of the retina is particularly sensitive to NMNAT1, and that NMNAT1 loss affects the different retinal cell types in an unequal manner. Overall, this study primes future clinical research into treatments for blinding diseases like Leber's Congenital Amaurosis and contributes to our fundamental understanding of NMNAT1's function, both in the retina and other organs throughout the body.

10. Effects of Acid Mine Drainage on Growth and Spawn Rates of Local Mushroom Species

Zachary Blake (Charleston, WV)

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

Acid Mine Drainage (AMD) is not a new problem within the State of West Virginia, it's been the topic of intensive research since the 1960's. The seepage of AMD leads to higher turbidity and higher concentrations of heavy metals within local water systems. With this dip in water quality, systems can see less individuals, diversity, and biomass. Fungi rely on high amounts of moisture to thrive, but the soil is becoming saturated with heavy metals and more acidic over time. Conditions that are too acidic or too high in metal concentrations may inhibit the spawning and growth of fruiting bodies. Fungi are decomposers and a key part of the circle of life; their inhibition may lead to an excess of dead organic material throughout our ecosystems. In this study, I explored the effects of AMD (0%, 25%, 50%, and 75% concentrations) on the growth of *Pleurotus ostreatus* and *Hericium erinaceus*. I am measuring spawn rates, relative mass, and the ratio of weight to surface area. I expect to see lower spawn rates and size as the acidity of the treatment increases, but at the same time I expect to see the weights increase. Fungi have the potential to absorb some of the dissolved heavy metals. My findings should display a negative impact on the growth of fungi due to conditions becoming more acidic over time and displaying higher concentrations of heavy metals, which could have a devastating effect on the consumers who may be unfortunate enough to indulge on them.

11. Behavioral Assays of Seven OMRI Approved Insecticides on the Biocontrol Generalist Predator, *Chrysoperla rufilabris*

Shyann Stewart (Dunbar, WV)

Institution: West Virginia State University
Field: Sciences (Biology)
Faculty Advisor: Barbara Liedl

Protected culture production of most crops uses biological controls as a part of their integrated pest management (IPM) program. No research has assessed the potential effects of these compounds on biological control agents. We evaluated the selectivity of seven OMRI approved insecticides against the generalist beneficial control agent, *C. rufilabris*, in behavioral assays. Thirty 2nd instar larvae for each insecticide were given the choice been sides treated with insecticide or the solvent control with data collected on ambulatory time, distance walked, velocity and proportion of time spent in each half of the arena for 10 minutes on a ViewPoint tracking system. The Wilcoxon rank sum test was used to test the significance of differences in treatment response. *C. rufilabris* larva expressed repellence to our positive control, DEET, with statistically significant responses for ambulatory time, distance walked, velocity and proportion of time spent in the zone. The solvent control showed no significance for any parameter. Larvae exposed to either azadirachtin product (Azera® or AzaGuard®) or Suffoil-X® had a statistically significant response for all the parameters measured that exceeded the response observed with DEET. The pyrethrin products differed in response with PyGanic® responding similar to DEET and the azadirachtin insecticides. Pycana™ was significant to a lesser degree. No significant responses were found for Oxidate® 2.0 or KleenGrow™. Products with azadirachtin, pyrethrins or mineral oil repelled green lacewing larvae which will reduce their foraging ability for pests on sprayed surfaces, but the two controlling plant pathogens did not.

12. Genome Wide Association Studies (GWAS) on Feeding Effects of Nigella sativa on *Drosophila melanogaster*

Samantha Belcher (Charleston, WV)
Zedan Martin (Institute, WV)

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

Bodyweight is a complex trait defined by several biological processes. In this report, we describe the genetic approach used for fighting obesity and diabetes as per the consumption of *Nigella sativa*. We also present a web-based pathway simulation that may occur due to consumption of the *Nigella sativa*. We are planning to do a glucose analysis. To identify genes affecting bodyweight due to the *Nigella sativa* diet, we assessed the total dry body weight of aged flies of the sequenced, wild-derived lines from the *Drosophila melanogaster* Genetics Reference Panel. The flies were fed with the *Nigella sativa* diet throughout their life. We performed genome-wide association analyses to identify candidate genes associated with variation in bodyweight. Through our GWAS analysis we found certain genes that explain the effects of change in bodyweight. We also performed pathway analysis using R spider to find the enriched sub-cellular pathways.

13. Additional Species Diversity of the Rhinebothriidean Genus *Stillabothrium*.

Hannah Hudson (Dunbar, WV)
Saira Rizwan (Morgantown, WV)

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 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). However, morphological study of specimens reveals the species consistent with other species of *Stillabothrium*, and analysis of ribosomal sequence place the species within the clade containing other *Stillabothrium* species.

14. Detecting genes from the nitrogen biogeochemical cycle in Kanawha River sediment

Chinyere Ugwuanyi (Dunbar, WV)

Institution: West Virginia State University
Field: Sciences (Biology)
Faculty Advisor: David Huber

The Kanawha river is surrounded by many environmental factors that affect it: chemical industries, forest, surface mining, municipal inputs, water, regional geochemistry, etc. These environmental factors are not the same in all parts of the river and this variation could affect natural microbial processes in the river. The purpose of this study was to detect the presence of nitrogen cycle genes, nrfA (nitrification) and nosZ (denitrification), in DNA extracted from the Kanawha River sediment and study the gene diversity in different parts of the river. Four sediment samples were collected, and their DNA was extracted. PCR was done to amplify the nrfA and nosZ genes using primers specific to the respective genes. PCR indicated the presence of both genes in river sediment. A cloning procedure was done with the nrfA gene after which the plasmids containing the cloned nrfA gene were recovered. PCR was done to confirm that the nrfA gene was cloned. The next step in this project is sequencing which would allow the diversity of the nrfA and nosZ genes to be analyzed from different locations.

15. The Effect of Habanero on the Body Weight of Drosophila Melonogaster

Samantha White (Cross Lanes, WV)

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

Body weight is a complex trait controlled by genetic and environmental factors. There are many possible approaches to addressing obesity. Here we focused on how a simple dietary change can help regulate body weight. Chili peppers are known to reduce body weight. We used the *Drosophila* Genetic Reference Panel of inbred, fully sequenced fly lines for a genome-wide association study (GWAS) of body weight difference with Habanero (*Capsicum chinense*) supplementation in the diet versus a control diet. We focused on a comprehensive study of candidate genes involved and their respective pathways. We validated 18 candidate genes with direct and indirect association with body weight. Performing a GWAS under controlled conditions broadened our understanding of various biological processes and pathways underlying the regulation of body weight with Habanero supplementation in *Drosophila*. We have selected three important mutants (*rg, gsc, CG 2202*) for creating double and triple mutants. We will be presenting genomewide transcriptome for the double and triple mutants in control as well as reared in habanero diet.

16. Evaluation of the Diversity within Diastema

Brian Moore (Glenville, WV)

Institution: Glenville State College
Field: Sciences (Biology)
Faculty Advisor: Jeremy Keene

Diastema is an erect herb distributed from Mexico southward into northern South America within the subtribe Gloxiniinae (Gesneriaceae). *Diastema* can be classified by five finger-like nectary lobes, racemose paired flower cyme, and fruit dehiscence. Throughout history *Diastema* has notoriously been classified incorrectly, and currently the genus is undergoing taxonomic investigation. *Diastema racemiferum,* the type specimen for the genus, was used for morphological comparison. This specimen was collected from the Island of Salanga, Ecuador. My research has focused primarily on examining the changes within the genus across its geographic range with a focus on Central America (specifically Panama). This genus is polyphyletic in Panama with most collections belonging to a new seperate genus *Pseudodiastema.* Morphological and molecular studies are being used to complete my goal. Morphological variance has been quantified from the available Ecuador and Columbian specimens in our herbarium. Morphological studies focus emphasis on reproductive characters while making use of vegetative features, as well. Molecular studies are performed to build a better understanding of the evolution of the species and genus. My previous work is being utilized to separate the genera currently attributed to *Diastema.* Future results from the molecular studies will provide more concise answers when building *Diastema's* phylogeny. My research will aid in the taxonomic investigation of *Diastema.*

17. Investigating the impact of increased water temperature on the mesoglea of the sea anemone *Exaiptasia pallida*.

Preston Allison (Sand Fork, WV)

Institution: Glenville State College
Field: Sciences (Biology)
Faculty Advisor: Sara Sawyer

Increased seawater temperature (ISWT) is a known stressor that induces coral bleaching. DeSalvo et al, 2008, and colleagues have shown that temperature stress in various species of corals alters expression of genes that regulate extracellular matrix (ECM) deposition and cytoskeleton rearrangement. The ECM, termed mesoglea, aids in tissue morphogenesis and development. Therefore, we are investigating how ISWT impacts the mesoglea of the symbiotic sea anemone *Exaiptasia pallida*. We are using *E. pallida* because they possess a symbiotic relationship with zooxanthellae and bleach like coral. The mesoglea of cnidarians is a gelatinous acellular mixture composed of mainly collagen, glycoproteins, and various other extracellular matrix proteins. Since collagen is the prominent component of the mesoglea, a common histological stain, Russell-Movat Pentachrome stain (RMP), can be used to observe changes in the mesoglea and various other ECM proteins via microscopy. RMP stains collagen yellow/orange, elastin fibers and nuclei black, fibrinoid intense red, mucins blue to green, and muscle red. Anemones are heat stressed from 25°C to 30°C for times ranging from one to 48 hrs, embedded in paraffin wax, sectioned, and stained with RMP. Histological differences between control and heat-treated anemones are detectable particularly in a reduction in the amount of collagen stained in heat treated anemones relative to controls. We are investigating a time series of heat stress to determine the onset of the differences in collagen staining and how that correlates with apoptosis. The goal of this research is to help elucidate mechanisms underlying temperature-induced bleaching in symbiotic anemones and coral.

18. Microbial decomposition of *Epifagus virginiana* litter in a WV forest soil

Allison Jones (Washington, WV)

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

Epifagus virginiana is a holoparasitic plant that obtains its nutrients from the American Beech tree, a common species found throughout WV forests. Very little is known about the microbial communities associated with this plant and the impact that this plant may have in the soil environment. Even though this parasite has little direct contact with the soil, these types of plants can have impacts on soil organisms through inputs of their Carbon and Nitrogen rich litters. Since nutrient rich litter can positively influence soil microorganisms, I hypothesized that *Epifagus* litter will increase soil CO_2 production during decomposition. I collected *Epifagus* plants at the Kanawha State Forest in Charleston WV, and used the method of substrate induced respiration to determine the effect of this litter in soil respiration. I found that CO_2 production was significantly increased in soils containing *Epifagus* litter compared to control soils after 72 hours of incubation (RM ANOVA $p=0.036$). Nitrogen chemistry and results from a second trial are on their way, where I will also address if the *Epifagus* associated soil harbored microorganisms that aid in the degradation of lignin. These are, to our knowledge, the first published descriptions of these processes regarding this holoparasite.

19. User-controlled strategies for effective enzyme immobilization

Madewa Adeniyi (Bridgeport, WV)

Institution: West Virginia University
Field: Engineering (Biomedical)
Faculty Advisor: Cerasela Dinu

Immobilized enzymes, notable for their specificity and biocompatibility relative to other catalysts, present efficacious potential of utilization ranging from cellular drug delivery to blood glucose detection. Advantages of immobilizing enzymes include increased stability and resistance to changes in the environment, namely pH and temperature. Consequently, it is important to study how immobilization's goals of high activity and high enzyme stability can be most effectively achieved. We hypothesized that hyaluronic acid (HYA), a polymer with known ease of chemical functionalization, could be used to achieve biocompatible, efficient support allowing increased enzyme implementation. To test our hypothesis, we used enzyme glucose oxidase known for its potential utilization for human monitoring. Enzyme loading and relative activity after HYA immobilization were determined using colorimetric assays, morphological characterizations were determined by atomic force microscopy, while chemical characterization of the enzyme-based conjugates was performed using Fourier transform infrared spectroscopy. Results demonstrate effective enzyme-conjugates formation, and high loading of such conjugates in hydrogels with reduced activity. Further study explores combining experimental and computational approaches to understand the conditions that allow effective immobilization.

20. Timing of Audiovisual Integration in Individuals with Autism

Kingsly Jonathan (Morgantown, WV)
Paula J. Webster (Bethel Park, PA)
John Bassler (Tuscaloosa, AL)
Sijin Wen (Morgantown, WV)
Margeaux Gray (State College, PA)
James W. Lewis (Morgantown, WV)
Shuo Wang (Morgantown, WV)

Institution: West Virginia University
Field: Health Sciences (Biomedical)
Faculty Advisor: Paula Webster

Autism is a developmental disorder that is often recognized after signs emerge such as language delays, repetitive behaviors, social communication deficits, and sensory differences. A critical aspect of sensory processing is the ability to integrate what we see and hear in order to make sense of the world. Previous research shows that individuals with autism may not integrate auditory and visual information in the same timeframe as those without autism and this wider temporal binding window (TBW) may contribute to core deficits in autism. Standard tests used to measure audio-visual integration have excluded many individuals with autism for task non-compliance; however, we hypothesized that many of these individuals have extremely wide TBWs beyond what is typically tested (500msec) and may constitute a subgroup within the broader autism spectrum disorder phenotype. Using a simultaneity judgment task in which participants indicate whether a tone and a circle are presented at the same time, we have measured the TBWs of 32 participants (Autism n=11 and controls without autism n=21). Our control group data replicates what has been found in prior studies, indicating our testing protocol works. The ASD data suggests they do in fact comprehend the task and that a subgroup whose windows were previously uncalculatable do have extremely wide TBWs for integrating auditory and visual information. In the future, we will recruit additional participants and correlate TBW measures with other measures including autism severity, IQ, and motor skills.

21. Perception threshold of external disturbances to locomotion in healthy young adults

Meredith Phillips (Hurricane, WV)

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

West Virginia has the second highest number of elderly adults living among its population percentage wise. Older adults are at a high risk of falling during locomotor tasks such as walking. Falls occurring during these tasks can be detrimental to an older adult's health and quality of life. In fact, greater than 80% of falls occurring to elderly West Virginians are due to falls. The long-term goal of this project is to investigate whether the ability to perceive a locomotor disturbance is altered throughout the aging process and associated with an increased fall risk. As a first step, the perception threshold of locomotor disturbances in healthy young adults was investigated. Participants walked on a dual-belt treadmill at their self-selected speed (SSWS). Every 5-7 strides, participants received a short duration change in velocity of a single belt of the treadmill triggered at heel-strike. Velocity change parameters (i.e., amplitude, direction, and leg) were randomized. After each disturbance, participants were prompted to response Yes/No if they felt the disturbance. Participants wore headphones with noise to eliminate auditory cues from the treadmill. The perception threshold was identified by fitting the data using a psychometric curve. Preliminary results from 5 participants (SSWS = 1.12 ± 0.09 m/s) demonstrate that healthy young adults are able to consciously perceive very small disturbances during walking (Δvelocity = 0.07 ± 0.02 m/s or 6.7 ± 2.2% of SSWS).

22. Adipose-derived secretome (ADS) mediates the stimulation of intestinal epithelial cell Na-Glucose co-transport during obesity

Vijaya Lakshmi Sundaram (Hurricane, WV)

Institution: Marshall University
Field: Health Sciences (Biomedical)
Faculty Advisor: Dr. Soudamani Singh

Background: West Virginia has one of the most obese populations in the United States. A common complication of obesity is diabetes, caused by altered glucose homeostasis. Glucose is absorbed along the small intestine via the glucose co-transporter SGLT1. Previous studies in obese Zucker rats have shown that glucose absorption via SGLT1 is stimulated. Further, secretome derived from fat tissue, or adipose-derived secretome (ADS) is thought to affect multiple intestinal functions during obesity. However, whether ADS may mediate the SGLT1 stimulation in obesity is not known. **Hypothesis:** ADS regulates SGLT1 in intestinal epithelial cells. **Aim:** Determine the mechanism of regulation of ADS on SGLT1 in intestinal epithelial cells. **Methods:** Rat small intestinal epithelial cells (IEC-18 cells) were treated with ADS media obtained from lean and obese Zucker rats. Na-dependent glucose uptake, Na-K-ATPase activity and Western blots for SGLT-1 were performed. **Results:** ADS from obese rats increased glucose absorption in IEC-18 cells (Lean-ADS: 693 ± 66 pmol/mg protein•2 min, Obese-ADS: 3507 ± 81, n=3, $p<0.05$). Na/K-ATPase activity was also inhibited in ADS from obese rats (Lean-ADS: 19.9 ± 1.3 nmol/mg protein/min, Obese-ADS: 9.1 ± 1.0, n=4, $p<0.05$). The protein expression of SGLT1 was unaltered between obese and lean ADS-treated IEC-18 cells. **Conclusions:** SGLT1 is increased in obese-ADS-treated IEC-18 cells. The mechanism of stimulation of SGLT1 is identical to that seen in obese Zucker rats. Therefore, the enhanced uptake of glucose via SGLT1 in obesity may be mediated by ADS and lead to the causation of diabetes in obesity.

23. Cisplatin Alterations in Mitochondria are Protected by Resveratrol

Chere Davis (Woodbridge, Virginia)

Institution: Glenville State College
Field: Sciences (Biomedical)
Faculty Advisor: Monica Valentovic

Cisplatin is a chemotherapy drug used to treat various types of cancer such as bladder, ovarian, and testicular cancer. Side effects induced from treatment include hair loss, nausea, low platelet count, and significant decline in renal function leading to irreversible nephrotoxicity. Resveratrol (RES) is an antioxidant found in chocolate, grapes and peanuts. RES has been reported to possess properties associated with anti-aging and anti-cancer. The purpose of this study was to evaluate if RES's protective effect on the kidney could reduce cisplatin cytotoxicity in a human noncancerous renal proximal tubular epithelial cell line (HK-2). HK-2 cells were plated and incubated for 48 hours. RES was added at a final concentration of 0, 5,7.5 μM for 1 hour. DMSO was the vehicle for RES. Cells were then co-incubated for 24 hours with 0,15 30 μM of cisplatin. Water was the vehicle control for cisplatin. Upon completion of the 24 hour period, cells were collected for evaluating cell cytotoxicity. All experiments were conducted as three independent experiments. Cell viability was assessed using MTT assay. RES was similar to control indicating it was not cytotoxic. Cisplatin was cytotoxic to HK-2 cells at 15 and 30 μM. RES attenuates cisplatin cytotoxicity. Western blots compared mitochondrial protein complex expression between cisplatin and RES treated groups. Cisplatin induction of apoptosis was measured using Caspase 3 cleavage. Cisplatin mediated induction of mitophagy was evaluated using western blot for LC3B I and LC3B II. Cisplatin was cytotoxic within 24 hours to HK-2 Cells. RES attenuated cisplatin cytotoxicity.

24. Reduction of Uranyl UO_2^{2+}(VI) by Iron and Zinc in Various Media: Single-Electron and Double-Electron Transfers

Levi Phillips (Arnett, WV)

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

Research in uranium chemistry has received much attention largely owing to the efforts in removal of toxic uranyl UO_2^{2+}(VI). Acid rain can result in the release of UO_2^{2+} from uranium mines in which the major form of uranium is UO_3 ($UO_3 + H^+ \rightarrow UO_2^{2+}$) into the nearby water system. Negative effects of ingesting UO_2^{2+} include renal failure, liver dysfunction, etc. One method to remove UO_2^{2+} from water is to reduce it to uranium(IV), which is able to form a precipitate UO_2 or $U(OH)_4$ readily in neutral or weakly alkaline media. Current research has shown that UO_2^{2+}(VI) in water was reduced by powdery metallic iron and zinc, respectively, to uranyl UO_2^+(V) via a single-electron transfer from the transition metal to the uranium(VI) valence shell. Then UO_2^+(V) was subsequently reduced to UO_2(IV) by the metals, which precipitated out of water, through another single-electron transfer. The reduction of UO_2^{2+}(VI) in 0.5 M sulfuric acid by Fe and Zn was shown to give U^{4+} directly via a double-electron transfer from the transition metal to uranium(VI). Further results, such as reduction of UO_2^{2+} by tin and hydroquinone, may be added as research is still being conducted. The reactions have been characterized by UV-Vis spectroscopy exhibiting absorptions of UO_2^{2+}(VI), UO_2^+(V), and U^{4+}, and showed continuous changes in their concentrations as the function of the reaction time. This research is significant in studying reaction mechanisms as well as in possible development of a practical method to remove harmful UO_2^{2+} from contaminated water system.

25. Organic Synthesis of Acylated Sucrose for Integrated Pest Management

Christopher Bias (Poca, WV)
Megan Spelock (Belle, WV)
Ciera Moles (Clendenin, WV)

Institution: West Virginia State University
Field: Sciences (Chemistry)
Faculty Advisor: Micheal 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 offspring that synthesize the acyl sucrose derivatives that has 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 derivatives 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.

26. Progress Towards Synthesizing an Aluminum Binding Ligand

Rachel Minney (Parkersburg, WV)
Joshua Ricket, (Dunbar, WV)
Brianna Hill (Elk View, WV)

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

Aluminum is an abundant metal that is suspected to cause serious health effects. The ligand (*E*)-1-(5-ethynyl-2-hydroxystyryl)napthalen-2-ol is capable of binding to aluminum, causing it to luminesce under fluorescent light. This gives it the potential to function as an aluminum indicator when used on sensors in waterways. In order to make this ligand, two molecules must be created and joined via a Wittig reaction. Presently, one of the 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 second molecule, triphenyl(2-(pivaloyloxy)-5-((trimethylsilyl)ethynyl)benzyl)phosphonium chloride, is still being synthesized, with successful completion of protecting the alcohol with a pivalate group and creating the alkyne using the Ohira-Bestmann modification of the Seyferth-Gilbert homologation. Column chromatography has been the primary method of purification. Proton and carbon NMR, as well as IR data has been used to confirm the formation of the desired products created up to this point. Chloromethylation of the alkyne has been attempted but has not yet been proven successful due to the presence of impurities. Future actions will be to protect the alkyne via silylation of the triple bond and to create the Wittig salt on the second molecule. This will then be joined with the first molecule, followed by deprotections to create the desired final product, (*E*)-1-(5-ethynyl-2-hydroxystyryl)napthalen-2-ol.

27. Approaches For Producing Large Domains Of Hexagonally Packed Nanospheres For Use In Nanosphere Lithography

Coy Smith (Ona, WV)

Institution: Marshall University
Field: Sciences (Chemistry)
Faculty Advisor: Michael Norton

Nanosphere Lithography (NSL) is the practice of using closely packed monolayers of nanospheres with the intent of transferring their pattern onto a surface. NSL has many applications, one of those being the production of plasmon active particles composed of gold or silver. Such structures may be used to increase the emission intensity of surface-bound fluorophores through the process of metal enhanced fluorescence (MEF). Signals from a single fluorophore molecule can be too weak for standard, off the shelf, camera chips to detect. However, with plasmonic enhancement enabled by using NSL, it may be possible to produce more practical sensor devices. In NSL, spheres must be positioned in a hexagonally close-packed array, leaving triangle-shaped holes everywhere that 3 spheres meet. These holes form triangular nanoscale stencils, or shadow masks, through which evaporated gold atoms can pass, resulting in the production of gold nanoparticles of predetermined size. Achieving large uniform arrays of 200 nm diameter nanospheres is the challenging objective of the studies reported here. Several parameters (size, surface composition, surfactant and manufacturer/vendor) as well as techniques for array formation on glass substrates have been investigated. In order to characterize the quality of the nanosphere monolayers, the films have been imaged using Scanning Electron Microscopy and Atomic Force Microscopy. High-resolution images reveal polymers bridging between the spheres, an unanticipated phenomenon that may limit the ultimate resolution of the NSL technique. The impact of sphere composition and sphere deposition methods on the size of the domains produced via these techniques will be presented.

28. HARPOON 2.0: Instrumentation Development to Support Hands-On Solar Energy Research

Sarah Starcovic (Cameron, WV)
Shannon Knowlton (Cameron, WV)

Institution: Fairmont State University
Field: Sciences (Chemistry)
Faculty Advisor: Erica Harvey

Solar hydrogen fuel generation through water splitting is the ultimate goal of a nationwide solar energy research initiative called the Solar Army. A fluorescence-based device called HARPOON 1.0 is currently used in the Solar Army to test oxygen-generating capabilities of mixed-metal oxide samples and identify samples that might catalyze water splitting. The West Virginia Brigade of the Solar Army, including First2 Network research students, is developing HARPOON 2.0. Based on a recent literature paper, HARPOON 2.0 is a new, less-complicated device to measure oxygen evolution. A suspension of titanium dioxide nanoparticles in sodium hydroxide nucleates the formation of oxygen bubbles above the metal oxide samples. The bubbles are visualized using scattered light. An important goal of this research is to make a classroom-friendly setup that allows students to be involved in real solar energy research and to see first-hand that science has a place in their lives and communities. The basic HARPOON 2.0 procedure has been developed and standardized and is currently being used in our lab. Recent improvements include changing the colors of light used to visualize the bubbles and using Image J to quantify and analyze the images taken of the oxygen bubbles.

29. Electrochemical and Spectroscopic Properties of Oligoviologen Radical Cations

Matthew Chapman (Berkeley Springs, WV)
Shelby Wellman (Prichard, WV)

Institution: Davis and Elkins College
Field: Sciences (Chemistry)
Faculty Advisor: Oma Morgan and Robert Morgan

Viologens are organic compounds, often in the form of salts, comprised of disubstituted dipyridyl components. Viologen subunits can be branched into polymers, giving the molecules a" tree-like" structure. These viologen polymers are the basis for an exciting class of compounds called oligoviologens. Oligoviologens have a variety of useful applications because of their redox potential, stability in the form of an organic radical, and their tendency to form host-guest complexes. Applications of this family of viologens can expand beyond the lab to include electrolyte components in flow batteries, oxidization of carbohydrates in organic fuel cells, molecular machines, electrochromic devices and much more.

The object of the project is to develop a simple method to synthesize families of oligoviologens with different caps on the end of the polymers, specifically benzyl and propanol groups, and study their electrochemical and spectroscopic properties. We have prepared viologens of varied length with the benzyl and propanol caps. These compounds exhibited a reversible Cyclic voltammogram and the UV/Vis spectrum of the cations and the radical cation (reduced species) shows a difference in absorption of approximately 270nm.

30. Antiproliferative structure-activity relationships of 5-substituted indoles and indole-based chalcones

Faith Kidd (Crab Orchard, WV)

Institution: Concord University
Field: Sciences (Chemistry)
Faculty Advisor: Darrell Crick

Indole-containing compounds and chalcones have proven useful as scaffolds for a variety of potent molecules with extensive medicinal applications. A series of substituted indoles and indole-based chalcones have been synthesized and evaluated against selected mammalian cancer cell lines and microorganisms. Hydrogen, bromine, fluorine, and methoxy, chosen due to their electron donating and withdrawing properties, were utilized in the indole ring structure. Compounds with bromine and fluorine substituents exhibited the highest potency against JEG-3 choriocarcinoma cells, MCF-7 breast cancer cells, and *Escherichia coli*.

31. Valorization of WV wood waste-streams using novel green solvents

Matthew Young (Chesterfield, VA)

Institution: West Virginia University
Field: Sciences (Chemistry)
Faculty Advisor: Benjamin Dawson-Andoh

The objective of this study is to convert wood bark, a waste-stream of wood processing, to value-added products using sustainable novel green solvents called Deep Eutectic solvents (DES). DES are prepared from low-cost, non-toxic, biodegradable natural materials (organic acids, sugars, amides, glycerol, etc.) and prepared by mixing; heating, stirring at low temperatures (<80 ^{o}C) to form solutions of lower melting point than the starting materials. The projected product from this process has potential applications such as barrier materials in packaging and dimensional stabilization and protection of wood from microbial deterioration.

The Forest Products Industry (WVFPI) in West Virginia contributes significantly to the state's economy. In 2017, their contribution to the WV state economy included 19,200 jobs and more than $ 1.4 billion in gross state products. However, the current method(s) used by the WVFPI to convert wood raw materials to lumber, wood composites, furniture, etc., and significant wood "waste" (sawdust, bark, chips, shavings, slabs and edgings) is aligned with the old "linear" economy - conversion of raw material to few products plus "waste" which is subsequently discarded because of low/negligible commercial value. In 2016, WV FP produced 10,259 tons of wood waste-streams. Approximately, 21% of this waste-stream represented bark, a material of very low commercial (usually sold as mulch). The project proposed here seeks to move WV Forest Products Industry towards embracing the *emerging bio- and circular economies* by the production of multi-products via the addition of high value to waste-streams using low-cost and sustainable methods.

32. Congenital Adrenal Hyperplasia: An Understudied Form of Adrenal Insufficiency

Rebecca Kaminski (Washington, WV)

Institution: Ohio Valley University
Field: Health Sciences (Community Health)
Faculty Advisor: Deborah Lynn

In recent years, adrenal gland disorders have become a greater public concern due to their negative impact on greater than 1 in 15,000 people in the Western World. An adrenal gland disorder can be debilitating to the patient's health if not diagnosed early because of its direct impact on hormones, such as aldosterone and cortisol, both of which regulate blood pressure and stress. With alterations in these specific hormones, the kidneys and heart are overworked resulting in the decline of almost all body systems. Congenital Adrenal Hyperplasia is a specific form of an adrenal insufficiency that involves the overproduction of aldosterone and thus the mechanisms involved in the body's ability to regulate stress. The mechanisms involved in this specific adrenal insufficiency are not well known, but it may involve a lack of cortisol production or a salt-wasting trait not typically associated with an adrenal disorder. There has also been significant evidence of the disease's association with the 21-hydroxylase steroid, but more research is necessary to elucidate the direct correlation. Many patients that suffer from Congenital Adrenal Hyperplasia can experience lack of movement, slurred speech, fever, vomiting, and diarrhea. If a patient cannot take oral medication (ie Solu-Cortef), one of the only treatments, an intramuscular injection must be administered to allow for normal body function. Currently, no cure has been identified. However, with researcher's greater focus on finding more efficient treatments, including prescription medication, we have a hope of mitigating the effects of this potentially debilitating illness.

33. Development of a multidisciplinary metabolic clinic in a primary care setting.

Grant DuVall (Bridgeport, WV)

Institution: West Virginia University
Field: Health Sciences (Community Health)
Faculty Advisor: Treah Haggerty

Primary care physicians are often the first point of contact for patients seeking preventative healthcare. An important health issue needing addressed in the nation and more specifically, West Virginia, is metabolic syndrome and obesity. However, addressing metabolic syndrome and obesity needs a new approach, served by a multidisciplinary primary care clinical team. This is an implementation study in an academic outpatient primary care setting. The implementation site of the multidisciplary metabolic weight loss clinic includes the following referring providers: 1) 17 academic family medicine physicians 2) 5 nurse practitioners, and 3) 2 physician assistants. The clinic serves approximately 11,000 patients per year. The team will consist of each of the following providers 1) physician, 2) pharmacist, 3) dietitian, 4) psychologist, and 5) nursing. This study is ongoing and new patient progress goals will be set at each appointment. This poster will explain clinic structure, implementation, and current patient progress. During an appointment, processed patients will meet with each member of the team to understand and get support through a holistic approach of weight loss as well as being enrolled in a healthy eating program. Success of clinic implementation will be measured from the referral frequency and retention of patients. Patients' clinical measures such as weight, blood pressure, vitals, BMI, neck/waist circumference, and mental wellness (anxiety and depression diagnosis) will be measured/analyzed over the course of regular visitation to the clinic. While this study is still ongoing, the clinic is receiving promising results of patient weight loss and improving overall health.

34. Using a Mystery Shopper Approach to Assess Emergency Contraception Access in West Virginia Pharmacies

Rebekah Kroeze (Biglerville, PA)

Institution: West Virginia University
Field: Health Sciences (Community Health)
Faculty Advisor: Amie Ashcraft

Despite changes in West Virginia state and federal FDA regulations to increase the accessibility of emergency contraception (EC), many barriers remain. These include community pharmacies not stocking EC, high out-of-pocket costs, unnecessary personal questions by pharmacy staff, required identification, and storage behind the counter or in a locked area. We used a mystery shopper approach to investigate EC access in all 550 community pharmacies in West Virginia. Each pharmacy received two phone calls in random order to assess EC availability, accessibility, and the accuracy of information provided: (1) a "transparent" call where a female member of our research team introduced herself and the purpose of the call, and (2) a "mystery shopper" call from a research team member posing as a 16-year-old girl. Phone calls were not recorded, but data about each call were entered into an online survey immediately afterwards. Data collection ongoing, but preliminary results reveal that 46% of the pharmacies have same-day availability of EC. Chain pharmacies are disproportionately likely to have EC in stock (73%) as compared to independent pharmacies (19%). Rates of misinformation provided by pharmacies are somewhat high in terms of age and identification requirements as well as the window of time in which EC should be taken after unprotected sex. EC access at West Virginia pharmacies is low, particularly at independent pharmacies that are commonly found in the most rural counties. Identifying and eliminating barriers to EC access may be an important component of reducing West Virginia's disproportionately high unplanned teen pregnancy rate.

35. The JUUL's Effects on The Oral Cavity and Lung Function

Emily Longerbeam (Morgantown, WV)
Victoria Rutherford (Morgantown, WV)

Institution: West Virginia University
Field: Sciences (Community Health)
Faculty Advisor: Alcinda Trickett Shockey

The JUUL is a sample of an electronic cigarette that is currently being used at a very high incidence throughout the United States. The participants are self-declared JUUL users. Respiratory flow was tested using a spirometer, pH of their saliva was tested using Litmus pH strips, and observation was utilized to describe the gingiva and oral tissues. The study determines the correlation between JUUL usage and the acidity of saliva, and if the JUUL affects respiratory output. Acidic saliva increases the risk of forming carious lesions (cavities) and basic saliva increases the participant's risk for calculus (tartar) formation. The experimental data from the spirometer readings and saliva test was compared to healthy values of the same age range as our participants. The target populations were males and females ages 18-24 selected through randomization. The JUUL decreased the pH of saliva and JUUL users have decreased respiratory function when compared to the normal lung function of 18-24-year-olds. From the spirometer readings, the JUUL can be related to xerostomia, which is dry mouth. Xerostomia can happen when the individual needs to inhale more frequently due to weakened lung function. Participants completed a survey to determine if the JUUL is the culprit by weighing in other factors such as their oral hygiene habits, medications and drug use, diet, and how often they use the JUUL throughout the day.

36. Coaching Palliative Home Care for Family Caregivers of Heart Failure Patients

Serenity McDill (Hedgesville, WV)

Institution: West Virginia University
Field: Health Sciences (Community Health)
Faculty Advisor: Trisha Petitte

Heart failure (HF) afflicts 6.5 million Americans with devastating consequences to patients and their family caregivers especially during severe symptoms in the advanced stage (NYHA III or IV). West Virginia has the highest HF death rates in the U.S. HF patients and their caregivers in rural settings lack sufficient guidance for managing HF symptoms at home.

The goal of home palliative care for HF is to help patients live better by relieving major symptoms (breathlessness, fatigue, depression and/or anxiety) and improving quality of life (QoL). Palliative care can be provided along with routine HF treatment, regardless of the stage of illness. Studies show that when patients and family members are educated about the typical progression of their symptoms and in-home treatment options, patients have less depression and anxiety and are less likely to readmit to the hospital.

The overall objective of this clinical trial study is to test whether the nurse-led palliative home care coaching intervention (FamPALcare) will improve home health outcomes for advanced HF at the 6-month follow up. Thirty-six patient and family dyads will be randomly assigned to standard care or FamPALcare intervention group. Standard care patients receive routine HF care while, FamPALcare patients receive standard care and 5-weekly coaching sessions in managing the HF symptoms and discuss selecting HF specific treatment options based on their preferences. Outcomes include improving QoL for patients and their families and decreasing unwarranted hospitalizations, improving quality of life for patients and their families. Students have opportunity to engage in the research process.

37. Rate of Participation in High-Risk Occupations from 2009-2017 amongst Asians in the U.S.

Fiona Galley (Morgantown, WV)

Institution: West Virginia University
Field: Other (Community Health)
Faculty Advisor: Carlos Siordia

The risk for workplace injury varies by occupation and participation in high-risk occupations is non-randomly distributed as a function of demographic characteristics. Enhancing understanding of occupational health and safety disparities allows for the creation of actionable knowledge to advance health equity. The specific aim was to explore between-group differences in rate of participation with high-risk occupations. Analysis included workers who reported one of the following ancestries: Asian Indian; Chinese; Filipino; Japanese; Korean; or Vietnamese. Observational study used American Community Survey (ACS) Public Use Microdata Sample (PUMS) single-year files from 2009 through 2017. Data on the analytic sample (unweighted=480,170) was used to estimate rates per Full-Time Equivalents (FTEs) by year and Asian ancestry. We used the replicate weight method to estimate margins of error. Statistical analysis indicated Filipinos engage in high-risk occupations at the highest rate. Observed between-group differences merit further scientific inquiry. Advancing metrology is crucial to promoting the health equity of understudied populations.

38. Dietary patterns and their relation to gingival health during pregnancy in Appalachian women

Alyssa Rittinger (Red House, WV)

Institution: West Virginia University
Field: Health Sciences (Community Health)
Faculty Advisor: Daniel W. McNeil

Background: Oral health remains an important public health focus in Appalachia. Particularly, pregnancy-associated gingivitis is common for women throughout pregnancy. Gingivitis during pregnancy is associated with negative health outcomes including pre-eclampsia, preterm birth, heart disease, and being a predictor of future periodontal disease, though the mechanisms are not well-understood. This study aimed to explore dietary patterns of Appalachian women as one potential determinant of gingival health during pregnancy.

Method: A cohort of pregnant women from WV and PA were recruited ($n = 1,349$) as part of a larger longitudinal study on oral health. Participants were administered a food frequency questionnaire and were given a rating of overall gingival health. Factor analysis techniques were used to identify dietary patterns. Multiple regression was then used to examine relations between dietary patterns and gingival health scores while controlling for age and smoking status.

Results: An exploratory factor analysis resulted in four dietary patterns (balanced diet factors, meat/potato factors, cereal/crackers, and junk foods). Age ($\beta=0.08$, $p<.002$) and smoking status ($\beta=-0.14$, $p<.001$) were significant predictors of gingival health. In addition, balanced dietary factors ($\beta=0.26$, $p<.001$), meat/potato factors ($\beta=-0.12$, $p<.001$), and cereal/crackers ($\beta=-0.10$, $p<.001$) were significant. Junk food factors, surprisingly, were not significant predictors of overall gingival health ($\beta=-0,03$, $p=.303$).

Conclusions: Eating a balanced diet including vegetables, fruits, cheeses, and nuts/beans may promote better gingival health in Appalachian pregnant women and affect pregnancy outcomes. Further research should continue to investigate overall diet quality in pregnant women and explore potential dietary interventions during this crucial life event.

39. In Vitro Effects of Aloe Vera at Varying Concentrations on Cariogenic Bacterial Growth

Kylie Sharp (Reedsville, OH)
Shelby Hawk (Morgantown, WV)

Institution: West Virginia University
Field: Health Sciences (Community Health)
Faculty Advisor: Alcinda Shockey

Periodontal diseases are fast becoming recognized as a major health concern worldwide. Poor understanding of oral health care and the implications of bacteria have led to an increase of periodontal disease, including gingivitis and periodontitis. Gingivitis is triggered by an accumulation of dental plaque, resulting in inflammation and bleeding. Treatments of periodontal disease aim to remove the bacteria's presence from the mouth using both manual and chemical methods.

There are numerous studies about the clinical efficacy of aloe vera being used to treat periodontal disease. There is a lack of information as to what concentration the aloe vera is most effective on cariogenic bacteria. Over-the-counter forms of aloe vera come in a wide variety of concentrations which makes it difficult to recommend the best product for patients.

To test this, a single-blind, benchtop trial lasting for fourteen days was conducted. First, *Staphylococcus aureus* was grown in a controlled environment. Then, the cultures were treated with tryptic soy broth, and 20%, 50%, and 100% aloe vera concentrations to test antimicrobial efficacy. This was done daily to mimic home care instructions given to patients. Final measurements were recorded by an uninvolved, blinded microbiologist.

Aloe vera of high concentrations were shown to be more effective at killing *S. aureus*. As such, dental hygienists that recommend natural antimicrobial products as an adjunct to daily oral care should recommend products that include 100% pure aloe vera. With the increasing incidence of periodontal disease, these results are vital in providing our patients with alternative treatment options.

40. Research on a new generation of neural networks based on Agent Technology

Jayden Creasey (St. Albans, WV)

Institution: West Virginia State University
Field: Business (Computer Science)
Faculty Advisor: Heng Wu

Since AlphaGo defeated Go player Shishi Li, deep learning has been widely used in different fields, Such as target recognition in Video,images, speech recognition, prediction of information. However, deep learning requires a lot of training data. In order to reduce the training data set, researchers propose some enhanced learning models based on deep learning. However, the current deep learning /Enhanced learning methods are some data mining methods based on statistical principles and data convergence properties. They mainly applies to image / video recognition , speech recognition, data prediction. These methods have the disadvantages of single application, difficulty in expansion, inability to learn independently, and inability to multiple learning. This project will focus on the research of new generation neural network based on Agent Technology and the information learning principle of biological nerve cells.

The project will use Agent technology and existing deep learning neural network technology to simulate the autonomous learning process of linear worm based on SPADA. Linear worms have only a few hundred neurons and are not very complicated to simulate. The computing power of existing personal computers is sufficient for this model process. The Agent has the function of sensing changes in the external environment and giving feedback. In conclusion, the project will provide undergraduates with a good opportunity to understand and simulate Neural Networks of worm, also agent programming. I hope that the results of the project will appear in relevant academic conferences.

41. Automatic Defect Detection in Bridge Inspection

Benjamin Day (Huntington, WV)

Institution: Marshall University
Field: Technology (Computer Science)
Faculty Advisor: Yoo Wook-Sung

Marshall University has developed a prototype of interactive Bridge Inspection Research using Drone (iBird) to provide a cost-effective and safe inspection management tool. Traditional bridge inspection methods through manual labor are costly, time consuming, and have high safety risks for inspectors. Some states have begun to invest in using new drone technologies to minimize risk to inspectors and reportedly cost savings of 66%. The *Automatic Defect Detection in Bridge Inspection* is an image processing project to detect any damages or cracks in concrete infrastructure, to then be incorporated into iBird. Traditional edge detection algorithms, such as the Canny Edge Method, have low detection accuracy with regard to images captured by drones, so we aimed to improve upon this algorithm. We applied more preprocessing techniques such as scaling contrast and amplifying intensity gradients. We also used Sobel operator and Laplacian image filters to reduce noise. Then a hysteresis edge marking system that automatically finds upper and lower thresholds based on image qualities was implemented to mark suspected cracks and created a final binary image for evaluation. Evaluation is done using the Lacunarity Method to evaluate image texture difference, or the measure of white and black pixels. This algorithm was integrated into the iBird project and field testing will be conducted to measure the accuracy of the algorithm.

42. 3D Modeling in Interactive Bridge Inspection Research using Drone (iBird)

Hwapyeong Song (Huntington, WV)

Institution: Marshall University
Field: Technology (Computer Science)
Faculty Advisor: Wook-Sung Yoo

To provide a safe and cost-effective bridge inspection, a prototype of the interactive Bridge Inspection Research using Drone (*iBird*) with 3D modeling was developed at Marshall University. As traditional visual inspection presents accessibility limitations, costs, and risks, some states are starting to explore how rapidly growing drone technology can be used to solve these issues, and this method results in cost savings of 66% over manual inspection. *iBird* consists of modules (1) building 3D model of bridge, (2) gathering inspection data from remote drone, (3) creating an interface for inspectors to generate inspection reports, and (4) providing web interface for the officials in Division of Highways to manage reports and view 3D models with drilling down feature. The models were created using actual bridge photos taken by a drone and include detailed bridge components and image linking. It is possible to perform a condition level evaluation of each element based on the rating codes from 0 to 9 suggested by the Federal Highway Administration. Each point has a color gradation depending on the condition which is overlapped on the 3D model of the bridge and users can intuitively identify and analyze the bridge's overall condition. This system helps to reduce worker safety issues and visually manage, and archive data in terms of sustainability. This study was conducted through the analysis of actual reports of bridge inspections in West Virginia, and field testing on a bridge. This report discusses the experimental limitations and future research directions.

43. Sybil Attack in the RPL-Based Internet of Things: Analysis and Defenses

Jacob Gressang (Huntington, WV)

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

The vision of the Internet of Things (IoT) foresees a future communication paradigm in which information systems will be seamlessly integrated with heterogeneous smart sensors and smart objects that are capable of communicating with each other without human intervention. These smart and connected devices generate data that will be utilized by IoT applications to aggregate, analyze, and deliver insight, which helps drive more informed decisions and actions. With the increasing demand of connecting resource-constrained devices to the Internet, the Internet Engineering Task Force Working Group has proposed a novel routing protocol for the IoT, referred to as RPL, as the communication standard for IP smart object networks. However, due to the shared medium and the lack of resources, physical protection, and security requirements of integral network protocols, the IoT running with RPL are undoubtedly vulnerable to Denial-of-Service attacks. In this project, we first present and investigate a new type of DoS attack, called sybil attack, and then propose a light-weight countermeasure to mitigate the sybil attack in IoT.

The results from this project on its own merits represent an inherently crucial aspect of network security due to the growing prominence of IoT in day-to-day life. There are projected to be over 64 billion IoT devices worldwide by 2025. However, it has been reported that over 80% of organizations using IoT have been affected by security breaches. This means that breakthroughs capable of bolstering IoT security are of intense demand.

44. Combating Advanced Vampire Attack: A Theil Index-Based Countermeasure in Internet of Things

Jacqueline Brown (Huntington, WV)

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

The on-going miniaturization of electronic devices and the maturation of wireless communication technologies provide a solid foundation for the emergence and development of Internet of Things (IoT), where a variety of multi-sized and heterogeneous nodes seamlessly interact and collaborate with each other to achieve common goals. In this context, IPv6-based low power and lossy networks (LLNs) are rapidly proliferating and leading to the further development of IoT applications. However, due to the shared wireless medium, and the lack of resource, physical protection and security requirements of network protocol, LLNs are particularly vulnerable to a specific Denial-of-Service attack, which can not only cause data packet losses, but also drain nodes' limited battery energy. This specific attack is coined with the name advanced vampire attack. Thus, in order to provide secure and reliable communication in the realm of IoT, it is essential to investigate the operation vulnerabilities of existing protocol and propose the corresponding countermeasures to potential attacks. In this project, we propose a Theil index-based countermeasure to effectively detect and mitigate advanced vampire attack.

The core scientific contributions of this research effort will be a deeper understanding of routing protocol in LLNs. We focus on underlying features of routing protocol in LLNs and practical obstacles and potential vulnerabilities important to the designing of attack-resilient communication protocols for resources-constrained devices in the IoT. The proposed research will also have important implications for other routing protocols in similar environments, and will provide design considerations to the broader IoT community seeking new research directions.

45. Emotion Classification of Users Based on Posts and Comments in Social Media

James Farley (Huntington, WV)

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

Correctly identifying mental illness and taking appropriate medical action is of utmost importance in this day and age. With mass shootings and mental health issues rising, it is a necessity to be able implement a system where we can easily and efficiently detect mental health issues of individuals. One way to do this is to consider social media, where the comments and posts from users allow for raw emotion to arise. Therefore, our objective in this research is to use various machine learning techniques as well as Natural Language Processing (NLP) to effectively classify a user as depressed or anxious, based on their posts and comments from social media. The problem regarding this subject is the difficulty in extracting meaning from natural language, especially data acquired from social media. There are preliminary publications that explain techniques to classify a specific message as depressive. However, those techniques are limited in regards to classifying users as either depressive or non-depressive. Therefore, in this research, we propose a technique to classify psychological problems and levels of depression according to users' data collected from Twitter and Reddit by using Machine Learning and Natural Language Processing methods. The results show that the proposed technique can identify the level of depression with high accuracy, although the training time of the machine learning model is significantly high. The organizations, security agencies, companies, and even users themselves could get benefits from this research by correctly identifying signs of mental illness of the person of interest.

46. Trade-off Model of Fog-Cloud Computing for Space Information Networks

Jarred Carter (Saint Albans, WV)

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

A steadily growing number of Internet-based service requests from the IoT has led to an increase in complexity and number of clients, resulting in an increased number of cybersecurity concerns. Although there are main security concerns with IoT services over cloud computing services, cloud computing is mostly preferred to provide seamless and scalable Internet-based services. Moreover, cloud service providers are continuously extending their capacity to reach more industries and address their concerns. For example, Amazon has recently launched a pay-as-you-go cloud computing service that will take place on satellite operators to provide more IoT services to industries such as the agricultural and shipping industries. However, the secure transfer of information within a space information network is of great concern due to the ability of numerous attacks between nodes to occur. This can be followed by loss of data Confidentiality, Integrity, and Availability. Several researchers have proposed multifaceted solutions to these concerns, including blockchain application, digital signature and symmetric/asymmetric encryption schemes, and centralized and/or decentralized key management for space information networks. In this research, we focus on the integration of fog-cloud computing and space information network. We primarily investigate the feasibility of fog-cloud architecture in space information networks and the benefits of having fog computing in the security of space information networks. This is accomplished mainly through the review of existing works on fog-cloud computing and space information networks, as well as the evaluation of both proposed solutions to potential issues regarding security.

47. Reintegration of Prisoners

Morgan Perrone (Vienna, WV)

Institution: Ohio Valley University
Field: Social Sciences (Criminal Justice)
Faculty Advisor: Beth Wade

Being incarcerated in the United states is considered the highest form of legal punishment. Individuals who have been incarcerated face the struggle of being a part of society again when they are released. The purpose of this study is to investigate the correlation between reintegration and prisoner re-entry. For people who have been incarcerated for an extended period, they will have a difficult time becoming a part of society due to the hard reality of how things are compared to how they were before they were incarcerated. Using qualitative data, this study analyzes the importance of reintegration in prisons so that prisoners have an easier pathway into society with a lower percentage of re-offending. Prisons who have reintegration programs and put forth the effort to provide the reintegration process for inmates were found to have the most successful rate of inmates rejoining society without re-offending. The study clearly answers the question regarding the correlation between reintegration and prisoner re-entry. Further studies are needed to provide us with what programs work best and what else can help prisoners become apart of society again.

48. Juveniles Charged as Adults

Josie Hayma (Ravenswood, WV)

Institution: Ohio Valley University
Field: Social Sciences (Criminal Justice)
Faculty Advisor: Beth Wade

Juveniles can be charged as an adult depending on the crime that is committed. Children as young as eleven have been sentenced to penalties set out in the code written for adults. Due to the living conditions in adult prisons, it is being questioned whether juveniles over a certain age should be allowed in an adult facility. The purpose of this study is to determine whether juveniles charged as an adult should be allowed in the same facilities as adult criminals who have committed felonies to the same extent or more severe than those juveniles. Looking at statistics, news articles, and databases that varied from state to state and worldwide, it can be concluded that the percent of juveniles being charged as an adult has gone up drastically in the past five years. The effects these prisons have on them can be and often are detrimental to their futures. The results of the research showed children as young as eleven facing adult trials for crimes that were committed. It also shows the rise in numbers as more and more children are charged with serious crimes and sent to higher courts. Based on articles, it can be concluded that the effects of these prisons will be with them forever and have caused disorders like PTSD for them to grow up with for the rest of their lives.

49. The Psychological Effect on Solitary Confinement Prisoners

Bradley Harrison (Vienna, WV)

Institution: Ohio Valley University
Field: Education (Criminal Justice)
Faculty Advisor: Beth Wade

Solitary Confinement is used on criminals who are deemed to be unfit for human interaction, due to violent behavior or psychological incapabilities. The environment in which these inmates are forced to live in, 60-80 square foot cells with little to no light, are being deemed inhumane due to the lack of space, accessibility, and the animal like living conditions. The purpose of this study is to look at the pros and cons of solitary confinement, and observing the psychological states of inmates before and after they are put into solitary confinement. Researchers will be able to see the effectiveness of solitary confinement, and if it's a healthy form of rehabilitation. More studies need to be performed before a definitive answer can be concluded from this hot topic issue.

50. Pregnant Prison Privileges Paper

Rachel Richards (Mineral Wells, WV)

Institution: Ohio Valley University
Field: Social Sciences (Criminal Justice)
Faculty Advisor: Beth Wade

Pregnant women incarcerated in jails and prisons fail to get the health care they need among the United States of America. The purpose of this study is to identify poor living situations commonly found among incarcerated pregnant women. Once these problems are identified researchers can educate leaders of authority to find resolutions. This research is based off of quantitative surveys; which examine pregnancy screening, special diets, drug rehabilitation, and the usage of retrains. Also, pregnancy statistics from 2016 and 2017, which are examining prison reports of the numbers of pregnant women, births, miscarriages, abortions, and other outcomes. There are aspects that pregnant incarcerated women undergo which need to be approved. Such as, 62.3 % of facilities preform a pregnancy test of all women entering their facilities, 54.3% do not put women suffering from opioid addictions through the withdrawal protocol, and 56.7% use restraints on women hours after having a baby. The outcomes of pregnancy from 2016-2017 among the United States of America that reported were 753 live births, 46 miscarriages, 11 abortions, 4 still births, 3 newborn deaths, and no maternal deaths. This study is to examine the practices that regional jails and prisons in the United States of America have in consideration to the pregnant women population they contain. In question to how incarcerated pregnant women lack the proper health care and well-being is identified and the outcomes of the pregnancies were collected. Further studies are needed to establish a causal relationship to result in more effective preventative measures.

51. Cycle of Child Abuse

Grace Martin (Gallipolis, OH)

Institution: West Virginia State University
Field: Other (Criminal Justice)
Faculty Advisor: Leighann Davidson

Children who suffer from trauma, whether physically or emotionally inflicted, by an adult or older guardian are at the risk of developing consequences. With every child, the circumstances surrounding the abuse differs with each case. The severity, type, and victim's perceptions of the abuse can determine the aftermath. Many survivors of child abuse display the repercussions they suffered once reaching adulthood. One question may enter the conversation: is there a cycle of violence? This project will look into the possibility of a direct correlation between survivors of child abuse and becoming adults and/or parents who abuse their children, the cycle of child abuse. It will also examine whether certain types of abuse cause psychological effects which condone a parent to abuse their child, also known as intergenerational transmission. Differential risks of the previous victims, survivors, and the current victims will be inspected to determine which victims are at a higher risk. The purpose of this project is to delve into the cycle of abuse that many survivors and victims of child abuse become part of due to differential risks in the individual and the offense itself.

52. Substance Abuse and its Correlation to Rise in Crime in West Virginia

Sierra Rabel (Scott Depot, WV)

Institution: West Virginia State University
Field: Other (Criminal Justice)
Faculty Advisor: LeighAnn Davidson

This paper investigates how the drug epidemic throughout West Virginia has been associated with an increase in crime rates. The research illustrated a connection between offenders with substance use disorder and criminal activity. In order to understand the relationship, we must first recognize the growth in crime rates and drug use individually. Since drug abuse has expanded across West Virginia, the data illustrated the crime rate intensified. Looking at the profile of offenders and the categories of crimes, the drug addiction plaguing our state will give specific insight to this on-going crisis. The research also tackled a proposed solution and/or approach which can assist with this widespread issue. Exploration into the response of the problems faced today with substance use disorder among offenders and their criminal activity will reflect the expectations of the criminal justice field to experience in the future.

53. Unveiled Stories: How Families Face Multiple Barriers Supporting Addicted Loved Ones

Angelica Stendardo (Huntington, WV)

Institution: Marshall University
Field: Social Sciences (Criminal Justice)
Faculty Advisor: Stephen Young

The Appalachian region continues to struggle with the multi-faceted issue that is addiction. The area, while showing improvement, still struggles to provide resources to the native population with regards to healthcare, addiction treatment, and mental health services. Research continues to demonstrate how vital these services are. However, little knowledge, especially in Criminology, exists that demonstrates the level of social stigmatization, trauma, and economic effects the lack of these programs has on families supporting these individuals. This research seeks to understand how supporters of addicted loved ones handle the barriers related to this support. Specifically, this project seeks to interview around 40 family members, nuclear and extended, and partners of individuals suffering from addiction in the Tri-State area. The goal is to determine how they manage the strain of supporting members through/around the economic, social, and criminal legal barriers. The overall purpose is to provide a meaningful voice to those who support these individuals to allow for the reevaluation of current policies to alleviate the cumulative trauma faced by the entire family. Special attention will be provided to both people of color and female family members to understand how the intersectionality of gender and race play into the experience and strain of supporting both the broader family unit as well as the addicted loved one. In general, the research will provide a platform for family members who are oft ignored to express their concerns with systemic flaws and tell their stories of how they work to provide for their loved ones.

54. Expanding Education Access to Incarcerated West Virginians

Edith Martinez (Athens, WV)
Karissa Ann Bjorkgren (Franklin, WV)
Jennifer Kayrouz (Charleston, WV)

Institution: Concord University
Field: Social Sciences (Criminal Justice)
Faculty Advisor: James White

The purpose of this research is to capitalize on the success of West Virginia Invests grant program by expanding access to free community college for currently incarcerated West Virginians in state prisons, who have completed high school education, but not a post-secondary degree. Education is indispensable in human develop and I am working with three WV residents to research the benefits of higher education for imprisoned people and persuade legislators to support this opportunity for returning citizens. Incarcerated individuals who participated in correctional education programs are 43% less likely to return to prison, while a one-dollar investment in prison education reduces incarceration costs by four to five dollars during the first three years post-release. Expanding access allow incarcerated West Virginians to earn an associate degree in a field that afford them more opportunities to participate in the local economy upon release. This not only reduces recidivism, which saves the state money, but helps the individual, their families, communities, and the state, at a time when WV is losing population. More educated West Virginians would translate to making money and paying more taxes, resulting in a state economic boom. There are no added costs for expansion, nor this opportunity be extended at the expense of nonincarcerated West Virginians; imprisoned people would be required to meet the same eligibility requirements, and maintain the same conditions for earning a free education, including a commitment to stay in WV for two years following degree completion.

55. Monitoring Fecal Coliform Levels in Pipestem Creek in Southern WV

Dakota Miller (Lerona, WV)
James Frye (Athens, WV)

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

Fecal coliforms are bacteria housed in the digestive tract of animals. When animals defecate these bacteria are exported to the surrounding environment and can contaminate nearby streams. We studied the fecal coliform levels in Pipestem Creek, a tributary to the Bluestone River which feeds into the New River in southern West Virginia. Pipestem Creek flows through expanses of forest, farmland, and residential areas before joining the Bluestone River. The residential areas house septic systems while the farmlands consist of open fields and pastures. The focus of this study was to determine the source of fecal coliforms and to use that data to implement land management practices that will serve to uphold the biological integrity of Pipestem Creek and the bodies of water it feeds into downstream. Water samples were collected from three sites throughout the year and fecal coliform bacteria were cultivated and counted. Median fecal coliform levels at each site exceeded the West Virginia standard of 400 CFUs/100ml (colony forming units per 100 ml). Higher fecal coliform levels were usually associated with heavy rain events in the watershed. Fecal coliform contamination of streams is a common problem in southern West Virginia, even in rural areas. Poor water quality due to fecal coliform levels can have a significant impact on the environment and human health.

56. The Evolution of Technology Within Education

Kate Kessler (Winchester, VA)

Institution: Shepherd University
Field: Education (Education)
Faculty Advisor: Jennifer Penland

Our education system is evolving rapidly, and a great deal of this is all thanks to our ever-growing technology. Technology and education work very much in sync, and many of us don't look very far into this matter. I felt as though diving deeper into this topic and finding out just how closely these two subjects link was really important. We can gain a better understanding of the relationship between the two and learn to continue expanding our classrooms to better suit the needs of all students.

57. Tactical Pen for Police and Military Personal

Dalton Grissel (Beckley, WV)
Jayden Dignan (Beckley, WV)
Kieren Samarakoon (Beckley, WV)

Institution: West Virginia University Institute of Technology
Field: Engineering (Engineering)
Faculty Advisor: Winnie Fu

The police and military protect and serve their community amidst very chaotic conditions. The nature of their work requires them to be prepared and organized. Our project is a tactical pen specifically designed for the police force, which will combine several important tools into one useful device. The features that will be included in this pen are a glass breaker, rotating handcuff key/shirt clip, LED light, an ink cartridge and a stylus tip. Just like any traditional pen, this pen will feature a shirt clip but will also act as a handcuff key. The LED light will exit through the writing tip of the pen, providing an illuminated surface that will assist in writing in the dark. Other features of this pen include a one-handed ink deployment mechanism, a waterproof casing, and a sleek, tactile design. The prototype will be developed and manufactured in Spring 2020, with rigorous testing to follow. The essence of this product is to provide police and military a compact, effective, and convenient tool to assist with their daily tasks.

58. Affordable K-2 Prosthetic Foot

Austin Yeater (Parkersburg, WV)
Dwayne Marcum (Lenore, WV)

Institution: West Virginia University Institute of Technology
Field: Engineering (Engineering)
Faculty Advisor: Winnie Fu

There are over 2 million amputees in the United States alone. The average cost of an amputation is almost $90,000. These costs include but are not limited to surgeon fees, hospitalization, prostheses, and rehabilitation. This means each limb will have a difference in price. The cost for a prosthetic foot only, can be thousands of dollars. The goal of this design is to develop a K-2 prosthetic foot that is more affordable to patients.

Amputees are assessed K-levels, from zero to four, based on activity. A K-level of two is a person who is semi-active, and needs to be able to walk, but will not be in a high stress environment such as heavy lifting or exercise. This means that the range of motion can be limited in a single plane. The most popular way of absorbing impact for prosthetics is the use of hydraulics. Hydraulic ankles absorb energy exceptionally, but the use of hydraulics make ankles heavy and expensive. Our initial concept shy's away from those designs by using a mesh structure that attaches to an inexpensive foot bed. This allows for the energy absorption to be relatively closer while allowing a much lighter and inexpensive prosthetic when compared to others on the market.

59. Development of Digital Models for Manufacturing of Surrogate Hands for Impact Tests

Trevor Brison (Morgantown, WV)

Institution: West Virginia University
Field: Engineering (Engineering)
Faculty Advisor: Eduardo Sosa

Hand injuries are a significant problem in all industries. Despite the continuous advancements in the technology and the safety procedures for production and maintenance tasks, there are still manual tasks that can produce hand injuries with varying degrees of severity. Metacarpal gloves are often used by workers to protect their hands against impacts, cuts, and other hazards. Testing the impact resistance of different glove designs requires the use of a surrogate hand. This work focuses on the development of a synthetic surrogate hand that can be manufactured and used systematically for impact tests. The making of the surrogate hand starts through the laser scanning of various hands and bones. The digital files resulting from the scans are then repaired, scaled, and assembled through mesh editing software to generate a representative hand size and posture. The resulting digital hand is then converted to a 3D printable bone structure and mold for manufacturing. The resulting digital hand also provides the basis for the development of simulation models of the physical impact testing done on the surrogate hands.

60. Techno-Economic Analysis of a Modular Steam-Methane Reforming Process

Carlie Ramsayer (Madison, WV)

Institution: West Virginia University
Field: Engineering (Engineering)
Faculty Advisor: Fernando Lima

Modular technologies have been attracting research attention due to the flexibility and mobility of their design. Modularization can be defined as any equipment, item, or unit that is able to fit inside of a steel supporting structure [1]. In the chemical industry, unique combinations of unit operations are joined together to enable process intensification (PI). Often, PI is employed in modular systems to drastically reduce the size of chemical processes and produce small modules of high efficiency. This concept incorporates contemporary designs that cannot be modeled with a conventional unit, so costing the equipment and modules can often be challenging. Due to the smallness of a module in comparison to a conventional plant, the economy of scale method cannot be used to accurately depict the module costs.

In this work, the economy of numbers, or mass production, must be implemented to show the learning curve for each module constructed which will more accurately quantify these expenses. The learning curve is a mathematical representation of how one would learn from building and running the first and subsequent modules, resulting in a more efficient manufacturing. This work examines a multitude of modular SMR units comprised of highly efficient microchannel reactors with integral heat exchangers working in parallel to discuss and compare the costs of modular vs. conventional SMR plants.

References:
[1] Roy, S. Consider Modular Plant Design. CEP Magazine. 2017, 113 (5), 28-31.

61. Digital Forensics for Iris Image Spoof Detection: A Case Study

Samuel Talkington (Bridgeport, WV)

Institution: West Virginia University
Field: Engineering (Engineering)
Faculty Advisor: Natalia Schmid

Digital forensics is a growing research topic. It assumes that every sensor has its own physical signature, a "fingerprint.'' Specifically, this fingerprint is in the form of electronic noise. It is unique to each camera due to the imperfections admitted during manufacturing of the camera array. This fingerprint can be used to identify the device and also to detect modifications to which images under consideration have been subjected. Digital forensics is applied to solve many cyber security problems. We focus on the problem of iris image spoof detection.

Traditionally, the electronic fingerprint of a camera is extracted from a uniform region of an image. To separate the camera fingerprint from the image, a signal processing approach known as "denoising" is applied to extract a clean version of the image first. Then, the camera fingerprint is found as a difference between the original image and the clean version of the image. We use a correlation coefficient to compare fingerprints of two images. This correlation coefficient aligns two images and evaluates the sum of the pixel-by-pixel product of the images. High correlation coefficients indicate that two images are of similar origin, while correlation coefficients close to zero indicates that the two images do not have anything in common. Here we analyze the potential of the device fingerprint to be used to identify spoofed iris images. We apply this concept to demonstrate that camera fingerprints have substantially different appearance and properties from those of the noise added to synthesized (spoofed) iris images.

62. Experimental Evaluation of the Marcellus Shale Properties

Torey Wright (Monroe, GA)

Institution: West Virginia University
Field: Engineering (Engineering)
Faculty Advisor: Majid Jaridi

The advances in horizontal drilling and hydraulic fracturing techniques have unlocked considerable amount of gas contained in Marcellus shale. However, the quantification of the petrophysical properties of the shale remain challenging due to its complex nature. Shale is naturally fractured rock rich in organic matter but with ultra-low permeability. In this study, petrophysical properties of the Marcellus shale will be measured using an innovative laboratory setup, referred to as Precision Petrophysical Analysis Laboratory (PPAL), available at the Petroleum and Natural Gas Engineering Department. PPAL is capable of measuring permeability and porosity of the shale core plugs under a wide range of confining and pore pressures. In addition, the adsorption characteristics of shale can be inferred from the measurements. Recently, a complete Marcellus Shale core sample and the relevant information has been donated to Petroleum and Natural Gas Engineering Department by Infinity Natural Resources. This provide a great opportunity to perform laboratory experiment on this new sample to determine the impact of pore pressure and net stress on the characteristics of the Marcellus Shale.

63. Studying the Pore Structure of Activated Carbon Manufactured from Coffee Waste

Olivia Rogers (Huntington, WV)

Institution: Marshall University
Field: Engineering (Engineering)
Faculty Advisor: Sungmin Youn

Activated carbon is the most widely used material to adsorb dissolved contaminants in water and wastewater treatment. Activated carbon has a very strong affinity for a wide range of dissolved organic contaminants, including both hydrophobic and hydrophilic molecules. For this reason, activated carbon is utilized for the adsorption of dissolved organic contaminants from drinking water sources. One example of such organic contaminants are the algae blooms that intermittently effect water sources such as the Ohio River. The effectiveness of activated carbon as an adsorbent derives from its extremely large surface area per unit mass. Activated carbon pores are classified by size as micropores, mesopores, and macropores.

In the present study, spent coffee grounds were collected at a coffee shop on Marshall's campus. The grounds were prepared for activation process by washing and rinsing with distilled water to remove impurities, drying, and then sieving to control grain size. Activation of prepared grounds was conducted using three different chemical agents: H_3PO_4, NaOH, and $ZnCl_2$. The Pore structures of activated carbon were then examined using scanning electron microscopy (SEM) in Marshall University. A more ordered structure of coffee residues, which provides a greater surface area, is observed after the chemical activation process. Figure 1 shows the SEM image of activated carbon manufactured with H_3PO_4. The sizes of activated carbon pores were calculated using an open source image processing program, ImageJ. The observed results suggest that manufactured activated carbon contains pores with diameters greater than 50 nm that can be classified as macropores.
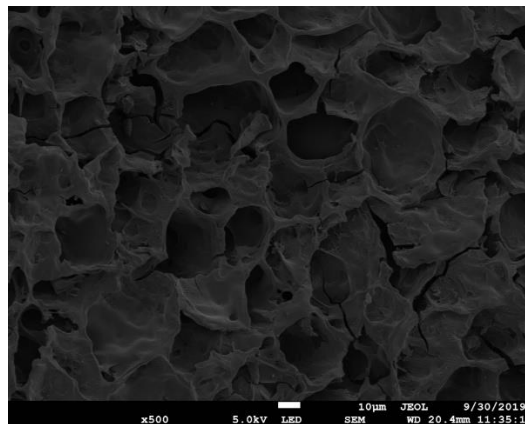

Figure 1: SEM image showing pore structure of activated carbon manufactured from coffee waste using H_3PO_4.

64. Deep Learning Based Diversity Combining for Generic Noise and Interference

Evan Allen (Williamson, WV)

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

Noise is an ever-present factor in wireless communications that must be mitigated to allow for proper data transfer. Among this noise various types can adversely affect the signals to this extent we developed a code that utilizes machine learning to review generated training data and enable the decoding of Quadrature Phase Shift Keying (QPSK) modulated wireless data affected by Gaussian and non-Gaussian noise of various types at a superior Bit Error Rate (BER) than conventional detectors. To achieve this, we utilized the TensorFlow library for python code in a multilayered dense neural network regressor equipped with a gradient descent optimizer to minimize the error function. The real value of this code is in locations with high quantities of incidental noise making this useful for possible high interference environments such as planes traveling through weather events; etcetera.

65. The use of bioremediation as a potential treatment for produced water

Abigail Paul (Jim Thorpe, PA)

Institution: West Virginia University
Field: Sciences (Environmental Sciences)
Faculty Advisor: Shawn Grushecky

A byproduct from the production of natural gas and petroleum is produced water. Large volumes of produced water are generated annually and can be as high as 2 million gallons per unconventional well. Produced water can be reused in the fracking process, injected in storage wells after use, or treated before being released into the environment. One possible treatment option, bioremediation, uses naturally occurring bacteria in soil around the sites of fracking to remove some of these toxins, specifically hydrocarbons. Using this method, produced water can be inoculated with these bacteria to potentially reduce the number of toxins present in the water. In this experiment, bacteria from well sites in the Appalachian region were cultured and used to study their effectiveness in treating produced water. A pure culture of bacteria from Saskatchewan was also cultured. These samples will be grown under three conditions; nutrient media with crude oil, nutrient media with produced water, and nutrient media with a mix of crude oil and produced water. A total of 36 samples were included, 3 replicates per treatment and bacteria culture. Bacterial growth will be measured using optical density for each of the samples. Water quality samples will be sent to the WVU analytical lab where it is then tested and compared to the original water quality of the sample. A significant reduction in the hydrocarbons present in the samples as well as a reduction in ion concentration is expected.

66. West Virginia Trout Stocking Survey: Catch Expectations vs. Reality Considering Angler Effort

Lindsey Hartzell (Arbovale, WV)

Institution: West Virginia University
Field: Social Sciences (Environmental Studies)
Faculty Advisor: Ross Andrew

From January to June each year, the West Virginia Division of Natural Resources (WVDNR) stocks trout into 200+ lakes and streams across the state. As the public agency responsible for fisheries management in West Virginia, the WVDNR strives to achieve high levels of angler satisfaction with its hatchery program and stocking efforts. Therefore, understanding perceptions of anglers utilizing these stocked resources is important to achieving optimal benefits while recognizing realistic expectations. Researchers at West Virginia University conducted in-person interviews (n=303) of anglers from March to June 2019. The survey questions assessed the anglers fishing experience that day versus their expectations. The angler's outcome of expectation versus experience was quantified based on the number of fish caught and the number of fish expected to be caught that day. These outcome values were compared across angler groups defined by # of days fished/year and % of weekend fishing effort. Using analysis of variance, no significant differences in expectation-reality outcomes were observed across three groups of # of days fished in a year (1-60, 61-180, 180+ days) or across three groups of % weekend fishing (0-30, 31-50, 51-100%). Using regression, a significant (p<0.001) positive relationship between the expectation-reality outcome and overall angler satisfaction was observed. A significant (p=0.03) negative trend was also observed between expectation-reality outcome and angler crowding perception. These results indicate that these expectation-reality outcomes may be driven by other factors outside of angler effort across annual and weekly frequencies, but outcome may predict satisfaction and perceptions of crowding.

67. Using sex ratios of Brook Trout to identify population resilience and spawning adult size structure

Bethany Wager (Waverly, WV)

Institution: West Virginia University
Field: Sciences (Environmental Studies)
Faculty Advisor: Ross Andrew

Brook Trout are the only native species of trout in West Virginia. Some Brook Trout populations may be more or less resilient to fluctuations over time and identifying drivers of their resiliency is important for conservation of these populations. Through research on 25 streams in West Virginia, we investigated sex ratios as a metric which may influence population variation and resilience over time. Defining the size of both male and female fish during the spawning period may also help determine reproductive potential within a given stream. We analyzed data from 2016-2017 and found females (153mm & 34g) to be slightly smaller than males (165mm & 41g) across sites on average. When comparing sex ratios, the expected result is that streams with a low population of females will also have higher levels of variation in population. Across sites, as the sex ratios descend from female-dominant and approach 1:1 the population numbers decrease. Furthermore, a negative trend was identified between the average female proportion of the population sample and the long-term coefficient of variation for overall Brook Trout abundance. We illustrate females as drivers of reproductive magnitude and their critical role to ensure stable population numbers and genetic variation into the future.

68. Development of electrochemical sensors for buprenorphine and naltrexone using screen-printed carbon electrodes

Sara Kuberski (Morgantown, WV)
Colby E. Ott (Shippensburg, PA)

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

The opioid epidemic is a serious public health problem across the United States, especially in West Virginia. The treatment of individuals suffering from addiction is a critical step in reducing the harm caused by this crisis. Unfortunately, only a few drugs have been approved by the Food and Drug Administration (FDA) to treat patients experiencing opioid addiction. Buprenorphine and naltrexone are two of these drugs, and their monitoring is of utmost importance from a compliance perspective. Therefore, the goal of this work was to develop an electrochemical method that facilitates their detection. Electrochemical techniques are fast, inexpensive, and can be used for point-of-care (POC) devices, making them ideal alternative solutions compared to traditional laboratory-based techniques such as gas and liquid chromatography-mass spectrometry (GC/MS and LC/MS). Additionally, screen-printed carbon electrodes (SPCEs) were utilized because of their small size and disposability. Both buprenorphine and naltrexone demonstrated electroactivity resulting in anodic peaks. Buprenorphine demonstrated an anodic peak at +0.29 V, while naltrexone demonstrated two anodic peaks: +0.45 V and +0.86 V. Square-wave voltammetry (SWV) was optimized and used to detect the target analytes. Buprenorphine was analyzed over the linear range of 1.86 µg/mL to 13.9 µg/mL (R^2=0.992), resulting in a calculated limit of detection (LOD) of 0.72 µg/mL. Calibration curves for naltrexone were constructed in similar fashion between 0.5 µg/mL and 10 µg/mL (R^2=0.998). The initial LOD was determined to be 0.40 µg/mL. Analysis of naltrexone and buprenorphine was conducted for simultaneous detection.

69. Quantification of Cannabis in Infused Consumer Products and their Residues on Skin

Sara Moreno (Lost Creek, WV)

Institution: Marshall University
Field: Sciences (Forensic Science)
Faculty Advisor: Rosalynn Quinones

Cannabis sativa is an illegal drug under federal law, but under state laws this drug has become less criminalized. States have begun to allow the medical and recreational use of cannabis to the point that products made from its components like Cannabidiol (CBD) and tetrahydrocannabinol (THC) have been commercialized. These products are sold in chain stores and online ranging from lotions to lip balms and across state lines. But each state has different regulations on the presence of CBD and THC in products and some states do not even allow medical use of these products. The anticipated outcome is a more comprehensive interpretation of products claiming to be infused with hemp, weed or cannabis and to have a more quantified understanding of the cannabinoids present and the residues they may leave. This project is also anticipated to help understand the more the undefined areas of the law in which CBD and THC products are consider both legal and illegal depending on the product use or the branch of government prosecuting a case. The goal is to discern whether these products may fit in a legal threshold and whether travel can be impended due to a passenger carrying these infused cannabinoid products. To accomplish this goal, various characterization and quantification techniques have been employed such as Chromatography, Mass Spectrometry, Spectroscopy, particle sizing, and a practical application of drug analysis with K9 units. Each technique will be used to help gain a better understanding of the cannabinoid presence in the products.

70. Fecal coliform contamination in the Brush Creek Watershed, West Virginia

Sophie Klein (Athens, WV)

Institution: Concord University
Field: Sciences (Geography)
Faculty Advisor: Thomas Saladyga

Fecal coliform contamination causes water pollution and increases the potential for contracting diseases from pathogens. Surface water in the Brush Creek watershed, located in Southern West Virginia, is known to be contaminated with fecal coliform bacteria. To assess the severity and spatial patterns of fecal coliform contamination, I collected water samples throughout Brush Creek watershed in rural locations and along urban stream segments in the vicinity of Princeton, West Virginia. In addition, I used a multiple-parameter water meter to measure pH levels, oxidation levels, and oxidation-reduction potential (ORP) or "cleanliness" of the water. In the lab, I analyzed the water samples in petri dishes. I intend to compare the results to an existing Brush Creek stream buffer quality index that was developed using a Geographic Information System (GIS).

71. Reorientations of Shallow Oceanic Crustal Dikes Based on Magnetic Data Acquired from the Southern Massif of the Semail Ophiolite

Katherine Allen (Charleston, WV)

Institution: Marshall University
Field: Sciences (Geology)
Faculty Advisor: Andrew Horst

The Oman ophiolite is the world's largest and best-preserved example of thrust sheets of the oceanic crust and upper mantle. Located in the Sultanate of Oman, in an exposed desert region, it occupies an area of nearly 15,000 km2 and has a relief of ~2 km. The ophiolite itself is composed of ~8-12 km of upper mantle rocks that formed deep below the earth's crust at a major submarine divergent plate boundary, cooling much slower than those rocks that were exposed and cooled at the surface. Above the mantle rocks are 4-7 km of oceanic crustal rocks that crystallized by the differentiation of aforementioned mantle rocks. An important question that still remains in understanding spreading centers is how the oceanic crust forms and is deformed both near the spreading ridge and during emplacement. Tools from structural geology and paleomagnetism are an invaluable resource for understanding the history of the Oman ophiolite from the time of its initial crystallization as oceanic crustal rock/mantle rock at a spreading center to the time of its emplacement along the Arabian Margin. To begin addressing this question, we have used structural and paleomagnetic data acquired from a drill core obtained through the Oman Drilling Project. Samples taken from these cores have provided upper crustal magnetic remanence data and dike orientations used to constrain two of the most likely possible scenarios for initial dike orientations upon intrusion. The translation between initial dike orientation to its current orientation allows for inference of possible ophiolite emplacement scenarios and proposed mechanisms of magmatic intrusion. The difference between the rocks exposed at the Oman ophiolite, and others found related to modern mid-ocean ridges and those still-submerged relics of past tectonic/magmatic activity, is that these are easily accessible and provide an area to test ideas and models otherwise difficult to reach, and very costly to pursue.

72. Between two worlds: power, politics, and noblewomen in early modern Europe

Jessica Hogbin (Hedgesville, WV)

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

Noblewomen, who have often been obscured in history, have been interpreted in various ways throughout the centuries. This historiographical analysis will span from writings by historians of the seventeenth century to contemporary authors. By combining what other scholars have written about numerous other noblewomen and reading primary documents by women of this status, the picture of early modern noblewomen becomes clearer and more dynamic. They were women in between two worlds, serving multiple purposes. Their motivations were more complex than any one-dimensional term can imply. They had ties and responsibilities to their paternal and marital families; they were mothers, daughters, sisters, and politicians. For these early modern noblewomen, these terms were not exclusive. Instead, they were simultaneous titles that they precariously balanced. Through this research, a fuller idea of the roles of women in power is developed among present-day historians, which can be built upon as individuals from the early modern period are studied.

73. Insiders and Outsiders on the Gay Community in Weimar Berlin

Jordan Nistendirk (Charleston, WV)

Institution: West Virginia University
Field: Humanities (History)
Faculty Advisor: Katherine Aaslestad

During the early twentieth century, Berlin became the world's first modern "gay capital." The forthright activism of the homosexual community, lax enforcement of anti-homosexuality laws, and a thriving gay nightlife culture combined to make Berlin unique. By the dawn of the "Roaring Twenties," Berlin's queer spaces were notorious tourist destinations for Americans, French, and Britons seeking to take advantage of cheap travel and explore the queer underworld that existed there. Salacious accounts of gay nightclubs, revues, and cafés were printed across the Western world in novels and travel guides. As their community enjoyed a global spotlight, however, gay Berliners struggled with conflicts within their movement, increasing attacks from across the political spectrum, and the looming threat of police crackdowns on their spaces. This project analyzed accounts of "Gay Berlin," from the eyes of tourists and native Germans to determine if tourist narratives accurately depicted the struggles faced by Berlin's queer community. My findings suggest that tourist accounts scarcely reflected the internal struggles and external threats faced by queer Berliners. Furthermore, the increased visibility of the gay community led to attacks from across the political spectrum, culminating in the Nazi-era persecution of gay Germans that nearly eradicated their community. In the present day, as acceptance of homosexuality is being debated still, it is important to consider how these debates do not address the lived experiences of many community members, and how the increased visibility of the community may lead to additional attacks on their rights and recognition.

74. Life in the Face of Death: Children in the Theresienstadt Ghetto

Molly Plante (South Charleston, WV)

Institution: West Virginia University
Field: Humanities (History)
Faculty Advisor: Katherine Aaslestad

I am researching the lives of children in the Nazi ghetto and transit camp, Theresienstadt. Established in 1941, Theresienstadt held a special status in the National Socialist concentration camp system as being the designated camp for privileged and famous deported Jews in the Third Reich. Theresienstadt was unique because it presented a façade, reminiscent of the "Potemkin Villages" in Imperial Russia, to the outside world as a comfortable site of relocation for the most famous Jews of Europe. Within the camp, however, conditions were harsh and cruel, and thousands were deported from Theresienstadt to death camps such as Auschwitz-Birkenau that were located on the eastern borders of the Third Reich. Theresienstadt was also unique because it was a camp heavily populated with children.

As often the weakest and most vulnerable members of society, I am interested in the survival of children interned in Theresienstadt. My research addresses how children survived in such unimaginably impossible conditions, and what external circumstances influenced a child's chance of survival within the ghetto. I am researching how an education system organized by ghetto elders functioned to shield the ghetto's youngest inhabitants from the harshest realities of ghetto life. I am examining memoirs, interviews, and video testimonies determine which common experiences were most responsible for the children of the ghetto's ability to withstand the deprivations of their environment and subsequently express their personal traumas in relation to their experiences.

75. Characterization of Drug Resistant B-cell Acute Lymphoblastic Leukemia Cell Lines

Sloan Nesbit (Morgantown, WV)

Institution: West Virginia University
Field: Health Sciences (Immunology and Medical Micobiology)
Faculty Advisor: Laura F Gibson

Despite advances in the treatment for B-cell acute lymphoblastic leukemia (ALL), relapse remains an issue, in part, due to mutations leading to drug resistance. In an effort to investigate strategies to target drug resistant cells, our lab created two chemo-resistant cell lines to use as a model. Through long term exposure to Cytarabine, Methotrexate, or Vincristine, all agents that are part of the standard of care regimens, six derivative cell lines were established. The two parental cell lines, REH and SupB15, were exposed to low doses of these chemotherapeutic drugs until a sub-population was selected for that were resistant. We then investigated differences between the parental and resistant lines that were derived over time by characterizing proliferation rate, the cell cycle distribution, protein expression profiles for specific targets of interest, mitochondrial activity, presence of lipids, and basal metabolic profile. We observed that all the tumor cells had an aerobic glycolytic phenotype, decreasing their reliance on oxidative phosphorylation even in the presence of oxygen, and increasing glycolysis. In addition, data suggests that the tumor cells are using an energy source in addition to glycolysis or oxidative phosphorylation, which may position them to adapt to harsh microenvironments that would not be favorable for their normal hematopoietic counterparts. Characterization of these chemo-resistant cell lines could help identify potential targets for treatment if a patient relapses with tumor that is resistant to standard therapies.

76. Investigation of Titanium-Dioxide Mesoporous Foams through 3D Printing in Microgravity

Alex Deardorff (Charleston, WV)
Carson Stebbins (Charleston, WV)
John Burke (Fredericksburg, VA)

Institution: West Virginia University
Field: Engineering (Material Science)
Faculty Advisor: John Kuhlman

3D printed hierarchal Titanium Dioxide (TiO_2) foams have advantages over conventional non-porous bulk materials, including low energy and monetary production costs, high strength-to-weight ratio, and potential space applications in solar cells, filtration systems, and radiation shielding for sensitive equipment or crew habitats. West Virginia University's Microgravity Research Team 15 (MRT 15) is investigating behavior of these foam inks under simulated microgravity conditions. MRT 15 has hypothesized that the printed foam may behave differently in microgravity than on earth, since fluids often behave unpredictably when the gravity force is removed, so that additive manufacturing of these foams in microgravity could be challenging. The team has designed and fabricated a specialized 3D printer to examine the effects of microgravity on the TiO_2 foam inks. Print quality is determined by several factors such as proper ranges of pressure, printing speed, and adhesion of the formulation to the printing substrates. Foam dimensional changes will be monitored via optical microscopy both during and post-flight to analyze the gravitational effects on foam characteristics over time. Resulting data from experimentation will include the rheology of the printed foam, the effect of microgravity on foam coarsening, and drainage of the liquid phase within the foam. Through a NASA Flight Opportunities Program grant, MRT 15 will fly their experiment aboard Zero-G Corporation's microgravity aircraft in November 2019. If successful, follow-on 3D printing aboard the ISS, followed by sintering of the printed foams, would enable measurement of microstructural, mechanical, and photocatalytic properties of the foams.

77. Extended Schur Functions

Chloe' Marcum (Huntington, WV)

Institution: Marshall University
Field: Sciences (Mathematics)
Faculty Advisor: Elizabeth Niese

The set of quasisymmetric functions homogeneous of degree n form a polynomial vector space, QSym, with multiple bases. Many of these bases can be generated combinatorially using tableaux with various rules. A basis of a vector space is a set of linearly independent elements that span the vector space and, given a basis, every element in the vector space can be written as a unique linear combination of basis elements. The bases of QSym we are interested in are the quasisymmetric Schur functions and the extended Schur functions. Both generalize the symmetric Schur functions. A common question in linear algebra is how to transition from one basis to another. We have an expansion of extended Schur functions into quasisymmetric Schur functions for a family of indexing compositions. We prove this expansion combinatorially by using a a tree whose leaves indicate the polynomials that appear in our expansion. This project has been supported by Marshall University's SURE Program and the WV NASA Space Grant Fellowship.

78. Tracking down the epidemiology of Huntington's Disease

Abby Sims (Parkersburg, WV)

Institution: Ohio Valley University
Field: Health Sciences (Neuroscience)
Faculty Advisor: Dr.Debbie Amos

Huntington's Disease affects more than 30,000 people in the United States and is fatal; therefore, it is evident that elucidating the mechanisms involved in the development and progression of the disease is crucial. Huntington's Disease or Huntington's Chorea is a neurodegenerative disease that is autosomal dominant. It is caused by a repeat extension mutation that influences brain degeneration primarily in the striatum and cerebral cortex. It generally has an adult onset and symptoms normally appear by age 40. This insidious disease causes the patient to have uncontrollable movements, lose voluntary motor control, have cognitive changes, and psychiatric alterations that negatively impact the quality of life. There are currently studies being conducted to discover the disease's pathology, so that the quality of life for the patients may be improved. To add to the detrimental effects, there is no cure for Huntington's Disease, but we are hopeful that research will lead to a breakthrough.

79. Repeat Concussions Impair Selectively Attention in Rats

Jeffery Adkins (Nellis, WV)

Institution: West Virginia University
Field: Sciences (Neuroscience)
Faculty Advisor: Cole Vonderhaar

Traumatic brain injury (TBI) can result in significant cognitive and motor impairments, particularly reduced attention as well as impulsive deficits. Even mild, or concussive TBIs, can impair function, which is compounded by multiple injuries. The current study investigated the effects of five closed-head injuries on impulsivity and attention in rats.

Twenty-three Long-Evans rats were simultaneously trained on two tasks, the five-choice serial reaction time task (5CSRT) and the delay discounting task (DDT). The 5CSRT measures motor impulsivity and attention, while the DDT measures choice impulsivity. Rats completed two sessions daily, 5CSRT in the morning and DDT in the afternoon. Once trained to a stable baseline, injuries were delivered using the Closed Head Impact Model of Engineered Rotational Acceleration (CHIMERA) system, a model of concussion. Rats received the TBI weekly (n = 14) for five weeks or control procedures (n = 9). Testing continued four weeks after the last injury was administered.

Attention was significantly impaired as a result of repeated injury, while choice and motor impulsivity were not affected. TBI rats also omitted more responses after injury. Rats showed no recovery during a four-week post-injury period. These results differ to prior findings within our lab in which impulsive deficits were the largest change after injury. This suggests that the injury may affect more areas of the brain than previously believed. Further study will be needed to understand why impulsive deficits emerge in some cases but not others.

80. Development of Biomechanical Tools For Assessment and Rehabilitation of Upper-Arm Functionality

Alexandra Collins (Lothian, MD)

Institution: West Virginia University
Field: Engineering (Neuroscience)
Faculty Advisor: Valeriya Gritsenko

Motor deficits caused by neuromuscular disorders, such as stroke or spinal cord injury, can have a devastating effect on an individual's quality of life. While current rehabilitative techniques can lead to functional improvements, residual deficits are common. The development of novel therapeutics, through either rehabilitation or assistive technologies, is hindered by the innate complexity of the musculoskeletal system. In this regard, biomechanical models provide a useful tool to assess the dynamic mechanical properties that govern movement. Our laboratory has previously developed a musculoskeletal model of the forearm and hand which has been integrated into a myoelectric prosthesis controller. We are currently expanding that model to include more proximal elements of the elbow and shoulder. We place particular emphasis on validating muscle paths and subsequent joint moment arms to provide accurate joint torque estimates. Our validation procedure includes a two-step process; the first step being a structural validation of muscle paths and the second is a functional validation of joint torques. We find that relatively small errors in muscle paths can have significant effects in both the magnitude and temporal profiles of muscle moment arms and can greatly affect the dynamics of torque generation. Future development will include our functional validation process and the implementation of the model in a neural prosthesis to address shoulder subluxation.

81. Camp FeWi: addressing the decline in female sport participation

Caitlyn Lyons (Morgantown, WV)

Institution: West Virginia University
Field: Humanities (Physical Activity and Sports Sciences)
Faculty Advisor: Dennis Jones

Research continues to prove that adolescence is a pivotal time for developing healthy behaviors and active lifestyles. Sport participation has direct benefits to youth. Through their learned experiences in sport, youth develop confidence, leadership skills, positive self-concepts, and a sense of connection to their schools/communities.Which in turn lead to long term benefits relative to career and health. Despite these advantages, there has been a significant decline in the number of young females choosing to take part in sport. Operating as an "earn and learn" program, Camp FeWi matches general participants with mentors in a six-week program where females from urban Pittsburgh are exposed to non-traditional sports (e.g., golf, tennis, and lacrosse). This study engages general participants, youth mentors, and coaches in semi-structured focus groups and surveys to understand and address the structural attributes hindering female sport participation. Data suggests that exposing youth to sport at an early age prompts them to continue pursuing sport. Through this exposure youth are more likely to gain self-confidence and leadership skills through sport participation than without

82. WV Municipal Parks and Recreation

Shelby Bayliss (Hurricane, WV)

Institution: University of Charleston
Field: Social Sciences (Political Science)
Faculty Advisor: Hallie Chillag

When the term "government" comes to the forefront of the mind, people most often picture presidents in front of the American flag or U.S. senators debating within the capital. However, the average American interacts with government on a local level much more frequently, and the actions of municipalities have the potential to have a more tangible impact on the communities in which they exist. Government also tends to hold a negative connotation in the majority of people's minds. Because of this, municipalities are more likely to have a positive impact on the way an individual views government as a whole, and with their parks and recreation facilities, local governments have the best chance of achieving a net positive impact on constituents.

My project is a comparative case study on municipalities in West Virginia, using Charleston, Huntington, Hurricane, and South Charleston. I compare these municipal governments' constituent satisfaction, using their administrative body's re-election rates as a measurement of approval within the given area. I compare this to the amount of each municipality's budget that is annually spent on parks and recreation in order to gauge what effect that such services could have on municipal success. In addition, my research compiles a list of the facilities and services offered at the different recreation facilities in these municipalities. My theory is that there is a positive correlation between the reelection rates of officials in cities with the most available recreation opportunities and services either created or maintained within a given administration.

83. Identifying Social Engineering to Safeguard West Virginia's Universities

Walter Warden (Delbarton, WV)
Hannah Householder (Falling Waters, WV)
Ely Osborne (Wallbach, WV)

Institution: Fairmont State University
Field: Social Sciences (Political Science)
Faculty Advisor: David Abruzzino

Since February 2019, Fairmont State's Open Source Intelligence Exchange (OSIX) has been analyzing a growing trend of social engineering attacks plaguing universities nationwide. These attacks seek to identify the plethora of personal and academic information residing in university databases. OSIX analysis has also detected the vulnerabilities of online subscription services, such as Microsoft Office 365, that are widely used by universities. The vulnerabilities of these services offer for malicious actors to use social engineering and other similar attacks to gain sensitive information and credentials, which can subsequently result in the compromise of financial, personal, and academic information. This information is then sold on the Dark Web (that part of the Internet not visible to or capable of being indexed by search engines), with the consequence of compromising the security of thousands of students in higher education. OSIX has analyzed the Dark Web to better understand the market for this type of information. Moreover, OSIX seeks to determine the identity of those seeking to exploit this information and their motives for doing so. Initial research has shown that in addition to individuals as well as criminal enterprises seeking financial gain, foreign intelligence services utilize social engineering to obtain information about university students, employees and lines of academic research. OSIX research in this area will support the West Virginia legislature's efforts to better protect the students and employees of its higher-education institutions against identity theft.

84. The Relationship between Depression, Stress and Substance Use in College Students

Eden Riggs (Athens, WV)

Institution: Concord University
Field: Social Sciences (Accounting)
Faculty Advisor: Adriana Falco

College students show statistically lower self-esteem and higher stress levels (Katirai, Williams, Katirai, & Fialkowski, 2018). This can increase major depression symptoms which can lead a student to become more susceptible to peer pressure and possible substance use. The factors that will be examined in this study are the correlation between substance abuse and stress and depression in college students. The participants will consist of 50 college students that will take inventories in a one-on-one setting. The inventories consist of the Perceived Stress Scale, the Brief Screener for Alcohol, Tobacco, and other Drugs, and the Major Depression Index. The preliminary data shows that there is a strong correlation between depression and stress and substance use within college students. The total preliminary sample size is 23 students and 16 of this sample scored at the level of potentially having a problem with substance abuse. These same 16 people also showed a correlation of stress and depression. Data is still being currently gathered to verify the results.

85. Dental Provider-Child Interactions in West Virginia Pediatric Dental Care Settings

Sarah Lipinski (Hurricane, WV)
Morgan Simpson (Summit Point, WV)

Institution: West Virginia University
Field: Health Sciences (Psychology)
Faculty Advisor: Daniel McNeil

Given the importance of promoting dental health in West Virginia, this study focused on identifying best practices for providers (e.g., dentists, hygienists) interacting with young children in dental practices and clinics. Current guidelines indicate that children should have a dental appointment by age one, or at the emergence of the first tooth, to prevent problems and to allow positive experiences. Early childhood experiences in healthcare appointments may impact lifelong emotional and behavioral responses. In early childhood, caregivers are typically involved in healthcare appointments, but there is little information known about interactions between providers and children. Dental appointments provide a space to study these early provider-child interactions in the healthcare system. For this study, data were collected from six dental practices across the state and region, including 120 children under the age of six and their caregivers, during dental appointments. These visits were videotaped, transcribed, and then analyzed by supervised undergraduate students using the Dyadic Parent-Child Interaction Coding System (DPICS). Specifically, labeled and unlabeled praises, direct and indirect commands, and negative talk were analyzed as they are strong influencers of child behavior. Statistical analysis showed that there were more direct commands during dental appointments than other interactions, consistent with the demands of the structured dental setting. Overall, there were many more unlabeled praises than labeled ones. Given the research supporting the power of labeled praises to increase child compliance, these data suggest that promoting dental provider use of labeled praises may enhance the positivity of dental experiences of young children.

86. Associations Between Adolescent Internet Use and Problematic Outcomes: The Role of Parental Monitoring

Julie Gilmore (Winfield, WV)

Institution: West Virginia University
Field: Social Sciences (Psychology)
Faculty Advisor: Aaron Metzger

According to the United States Department of Health & Human Services, West Virginia's rates of adolescent depression and suicidal ideation are above the national average. Previous research has found consistent associations between problematic internet use and exposure to cyber bullying (Mesch, 2009; Navarro et al., 2012), and other negative outcomes such as depressive symptoms (Gámez-Guadix, 2014; Samela et al., 2017), school burnout (Samela et al., 2017). Research also indicates that parents may play a role in protecting their adolescents from risky online experiences such as cyber bullying victimization (Navarro et al., 2012). The goal of this study is to investigate the role of parental monitoring in the relationship between adolescent internet use, depression, and cyber bullying. The sample for our study was 161 West Virginia adolescents and their parents. Participants answered questions regarding social media use, depressive symptoms, and cyber bullying behaviors. Parents reported if and how they monitor their adolescent's internet use including family rules about internet use, parents directly asking their teens about their internet use, and other forms of internet monitoring such as checking adolescents' social media profiles. We anticipate that when parents engage in healthy levels of monitoring of their adolescents' online behavior, adolescents will engage in lower levels of risky internet use and will also experience lower levels of cyber victimization. This study will provide insight into factors that contribute to depression in West Virginia youth and can be used to inform policy regarding cyber bullying among minors.

87. Association between social behavior and face responsiveness in autistic and healthy brains

Savannah Hays (Mineral Wells, WV)

Institution: West Virginia University
Field: Social Sciences (Psychology)
Faculty Advisor: Shuo Wang

Face perception plays a key role in human's social behavior and humans have a dedicated neural system to process faces. However, brain activation strength and patterns within this face-processing system vary substantially across neurotypical individuals and people with autism spectrum disorder (ASD). Although there is a plethora of literature showing atypical face processing in people with ASD, the underlying neural mechanism for this profound social impairment still remains unclear. Furthermore, whether and how individual differences in neural response to faces are related to social behavior remains controversial. Solving these questions is important for unravelling the neural mechanism of face perception and providing new clues for autism diagnosis and early interference. In this study, we first investigated these questions by correlating the strength of neural activity in face-selective areas (i.e., brain areas that specifically respond when participants view faces) with behavioral measurements of social personality traits. Next we compared brain-behavior association between the neurotypical individuals and people with ASD. Our results from neurotypical groups showed a significant correlation between social behavior with 1) activation magnitude in the left amygdala, anterior temporal lobe (ATL), and right anterior superior temporal sulcus (raSTS), 2) size of the rp STS and inferior frontal gyrus (IFG). Preliminary results from autism groups showed a significant negative correlation between behavior and activation magnitude in the lmSTS and laSTS. Our findings suggest that prosocial behavior is achieved by greater brain response to faces in neurotypical individuals and people with ASD but the effected brain areas are not the same.

88. Resiliency for Appalachia-Youth Overcoming Trauma and the State Opioid Response

Samantha Holbert (Bridgeport, WV)
Kelsey Keen (Harrisburg, PA)
Josh Roark (Fairmont, WV)

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

Opioid addiction has become an increasing problem throughout the country and has negatively impacted children, many of whom have experienced neglect, trauma, and behavioral problems as a result. In an attempt to highlight the impact of the opioid epidemic in the state of West Virginia, this study will investigate the Resiliency for Appalachia-Youth Overcoming Trauma (RAPP) and the State Opioid Response (SOR) grants. The purposes of these grants are to train therapists and increase evidence-based services for those affected by the opioid crisis, especially in Southern West Virginia. Funding for the SOR grant totals $2,351,665,502 across states and equals $70,685,383 in West Virginia alone ("State Opioid Response Grants," 2018). Both grants aim to spread mental health resources throughout the state, including Parent-Child Interaction Therapy (PCIT) and Trauma-Focused Cognitive Behavioral Therapy (TF-CBT). In PCIT, therapists coach caregivers to improve the caregiver-child relationship and child behavior, compliance, and social skills. TF-CBT treats child trauma by targeting negative behavior, depression, anxiety, anger, and stress through coping skills and gradual exposure. In addition, free in-home services are offered to make treatment more available to those who do not otherwise have access. Not only do these grants help the families who are participating in the program, but it also helps to train therapists and their trainers. Preliminary data on the success of these programs will be presented and discussed (e.g., numbers of therapists trained, counties reached, and families served).

89. Political Affiliations and Happiness: How Do Liberals and Conservatives Differ?

Liam McCabe (Morgantown, WV)

Institution: West Virginia University
Field: Social Sciences (Psychology)
Faculty Advisor: Amy Gentzler

The current study examines the relationship between individuals' political affiliations, subjective happiness, and definitions of happiness. Previous research suggests that conservatives/republicans report higher levels of happiness than liberals/democrats (Pew Research Center, 2008; Wojcik, Hovasapian, Graham, Moty, & Ditto, 2015), although liberals display more positive emotional expressions such as genuine smiles and positive speech. We hypothesized that conservatives will report more happiness than liberals. We extended research by exploring whether political affiliation was related to how people define happiness. This study was conducted using a survey given to 361 adults, mainly in West Virginia. Measures included a question asking participants about their political leaning (7-point scale from 1= very liberal to 7= very conservative), scales from the Definition of Happiness Measure (Ford et al., 2015), and the Subjective Happiness Scale (Lyubomirsky & Lepper, 1999). Using correlational analyses, results indicated no significant association between political leaning and subjective happiness. However, political leaning and definitions of happiness were significantly related in that more liberal adults rated hedonia (pursuit of pleasure) and positive feelings (relaxation, excitement) as more important to happiness, whereas more conservatives adults rated religious beliefs as more important. The results of this study offer new evidence that people's political leaning is unrelated to how happy they are, but is related to how they define happiness. Knowing how each side of the political spectrum defines happiness could help politicians and media to understand differing viewpoints and have a greater chance to increase bipartisan agreements.

90. Parental Addiction is Associated with Adolescent Mental Health

Madeline Price (Morgantown, WV)

Institution: West Virginia University
Field: Social Sciences (Psychology)
Faculty Advisor: Amy Gentzler

Children who are introduced to adverse childhood experiences, such as parental addiction, can be at increased risk for developing mental health problems (Fuller-Thompson et al., 2013). Around 9.3 million children are exposed to illicit substance use in at least one of the parents in the United States (Gorka et al., 2016), and 28.8% of West Virginia adults experienced a parent abusing alcohol or drug abuse while they were growing up (WV Department of Health & Human Resources, 2014). The present study examines the association between parental addiction and adolescent mental health in a sample of 244 mothers and 9th graders (mostly West Virginian families). As part of a larger study, mothers and adolescents independently completed surveys. This presentation includes a subset of surveys and only includes biological mothers. Mothers reported on their own addiction to alcohol, tobacco, gambling, or illicit substance use as well as addictions of their adolescent's biological father. Adolescents reported on their levels of depressive symptoms with the *Children Depression Inventory* (Kovacs, 2012) and anxiety symptoms with the *Generalized Anxiety Scale* (Spitzer et al., 2006. Results showed significant associations between the number of mothers' reported addictions and adolescents' reports of higher levels of anxiety and depressive symptoms. Similarly, the total number of the biological fathers' addictions was also significantly correlated with higher symptoms of anxiety and depression in the adolescents. By understanding the potential impacts of parental addiction, programs can be implemented to reduce the adverse effects of addictions on children.

91. Impacts of Parental Psychological Control and Substance Abuse on Adolescent Depression

Sarah Segear (Morgantown, WV)

Institution: West Virginia University
Field: Social Sciences (Psychology)
Faculty Advisor: Aaron Metzger

Children of parents who abuse drugs and alcohol are at increased risk for a wide range of negative outcomes including increased internalizing problems such as depression. Parental substance abuse is linked to extreme negative parenting behaviors such as abuse and neglect (e.g. Lander et al., 2013). However, less research has explored associations between parental substance use and other forms of negative parenting (i.e. psychological control). Psychological control is a problematic set of parenting behaviors including guilt induction, love withdrawal, and conditional approval. Parents' use of psychological control predicts increased adolescent depression and depressive symptoms. Previous research has not considered predictors of parents' use of psychologically controlling behaviors. The current study will examine associations between parental substance abuse, parental psychological control, and adolescent depression. Specifically, we will explore whether psychological control can explain the relationship between parental substance abuse and adolescent depression. We will also test whether high levels of parental substance abuse will magnify the likelihood of depressive symptoms of adolescents with psychologically controlling parents. Participants will include 160 West Virginia adolescents and their parents (both mothers and fathers). The National Institute on Drug Abuse states, in 2017, there were 833 drug overdose deaths involving opioids in West Virginia, a rate of 49.6 deaths per 100,000 persons. This is threefold higher than the national rate of 14.6 deaths per 100,000 persons. This research is important to the state of West Virginia because it examines how substance abuse affects family process and the mental health of West Virginia adolescents.

92. The Influence of Attention and Difficulty on Perception of Time

James Joyner (Frederick, MD)

Institution: Shepherd University
Field: Social Sciences (Psychology)
Faculty Advisor: Larry Daily

This presentation is a report on a study of perception of time. Based on Attentional Gate Theory (AGT; Block & Zakay, 1996), it was originally hypothesized that small changes in attention would cause participants to overestimate a 60-second duration. Briefly, AGT explains the adage "time flies when you're having fun;" distraction leads to overestimation. A sample of 100 participants, randomly assigned to three conditions, estimated a duration using a stopwatch while performing a card-sorting distractor task. The first condition was the simplest with one timing task and one distractor, the second added an additional timing task as a distractor and the third included a choice of when to start the additional timing task. The results were within expectations of AGT. Yet a pattern opposite of what was expected inspired the researcher to explore further. In two of the three conditions, participants significantly overestimated the duration; in the third and most difficult condition, participants' estimates were not significantly different from the target. Between the conditions, the only differences were the timing tasks and the provided directions. The timing tasks were not very different, but the directions did differ in difficulty. Prospective timing seems to share mental resources with the executive functions (working memory, mental flexibility, self-control, and others) and the more difficult instructions of the third condition reduced the effectiveness of the distractor task on the duration estimate (Lovaš and Kačmár, 2016). This research adds to psychology by providing a better understanding of interaction between cognitive processes.

93. Malleability of Public's Perceptions on Addiction

Heather Connery (Hurricane, WV)

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

This study will examine the ability to change the public's perceptions about addiction. The controversy around addiction is rooted in the argument of whether addiction is a result of free will or determinism. Free will assumes that people make choices that are to some degree independent of antecedent conditions (Viney, 1986). Determinism assumes the existence of causes, both known and unknown, for every behavior or experience (Viney, 1986). Perceptions are formed on a variety of factors, including social influence and political ideology. Therefore, what is used to create these perceptions of addiction, may also be used to change them (Myers & Twenge, 2018). The present study utilizes a pretest-posttest design to investigate beliefs about why people experience substance addiction. First, participants will complete a demographic questionnaire and pretest about the causes of addiction. Next, participants will be randomly assigned to read a scenario depicting the story of an addict from a free will, neutral, or determinism viewpoint, and asked to complete a posttest questionnaire. The posttest will measure perceptions on the scenario and will be compared to the perceptions on the pretest. Variables on both the pretest and posttest will utilize Likert-type scales. I expect when the prime and the scenario are congruent, participants will experience the greatest shift in perceptions, while incongruence will lead to little perception shift. The findings are of relevance in West Virginia as the opioid epidemic, and blame is placed on the addict, instead of a focus on helping them.

94. The Halo and Horn Effects: Making Judgments Without Awareness

Hayley Haynes (Lenore, WV)

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

The Halo and Horn Effects are cognitive biases in which people unknowingly make an overall judgment of an individual based on a single positive or negative characteristic. For example, someone who is considered attractive would be more likely to be described as smart, funny, talented, and nice. In the current research, participants rated a series of photographed individuals on various characteristics including attractiveness, likelihood of criminal behavior, intelligence, happiness, aggression, and safety. The highest rated photographed individual on attractiveness was compared on the ratings of these characteristics to the lowest rated individual on attractiveness. Based on the findings of past research and the Halo and Horn Effects, it was hypothesized that the more attractive rated individual would be rated as less likely to be involved in criminal behavior, more intelligent, happier, less aggressive, and safer to be around compared to the least attractive rated individual. This research could possibly provide some insight on how defendants are judged within court settings.

95. Graduate Students' Identification with Science: The Roles of Demographics, Experiences, and Discipline

Riley Darragh (Nottingham, PA)

Institution: West Virginia University
Field: Social Sciences (Sociology/Social Work)
Faculty Advisor: Christopher Scheitle

What factors influence an individual's formation of a scientific identity? Research examining high school and undergraduate students has demonstrated the importance of identity formation for students' confidence, retention, and aspirations in science. While we know some of the key predictors of science identity formation among these populations, relatively little work has looked at these issues among graduate students. The study presented here utilizes data from a survey of graduate students in the United States in five disciplines: biology, chemistry, physics, psychology, and sociology. A structural equation model is estimated to determine the demographic-, experiential-, and disciplinary-effects on graduate student identification with science and, separately, identification with their discipline. The analysis finds that, relative to men, women have weaker identification with science but do not differ in their identification with their discipline. Experiences, such as the quality of students' relationship with their advisor and publishing research, are positively associated with the strength of their science and disciplinary identity. Students in psychology and sociology have weaker identification with science relative to biology students, while sociology students also have weaker identification with their discipline.

96. Status, Trust and Their Effects on the Allocation of Positive and Negative Rewards

Colter Uscola (Morgantown, WV)

Institution: West Virginia University
Field: Social Sciences (Sociology/Social Work)
Faculty Advisor: Lisa Dilks

Previous sociological research highlights a connection between social status and perceptions of trustworthiness: Individuals with higher social status are perceived as being more trustworthy. Does occupational status affect an individuals perceived trustworthiness levels? If so, do varied levels of trustworthiness contribute to a difference in positive and negative reward allocation? Our current study uses status characteristics and reward expectations theories in the creation of a theoretical instrument which ties status and perceptions of trustworthiness to the allocation of positive and negative rewards. We test our theoretically derived hypotheses in an online experiment using corporate malfeasance and propriety (i.e. bad vs. good deeds). Vignettes are utilized in the depiction of either an accountant (low status) or chief financial officer (high status) committing or reporting financial statement fraud. Approximately 200 participants were tasked with allocating positive rewards (i.e., bonuses) when fraud was reported and negative rewards (i.e., monetary/prison sentencing) when fraud was committed. We also measured participant perceptions of power, crime severity, status, trustworthiness, and morality. We deploy a variety of quantitative analyses to determine whether the effects of status (high/low) and trustworthiness (high/low) vary depending on the type of reward allocation (positive/negative). Preliminary results obtained in a pilot study underscore that both chief financial officers and accountants are punished more critically for bad deeds than they are rewarded for good deeds.