2-16-2018

15th Annual Undergraduate Research Day at the Capitol
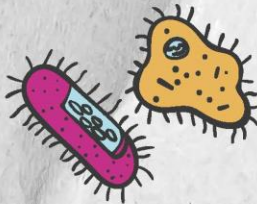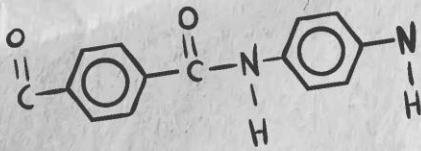
15th Annual Undergraduate

RESEARCH
DAY AT THE
CAPITOL

February 16, 2018

I. PARTICIPANTS BY HOUSE DISTRICT (as provided by participants)

House #	Participant		Poster #
1	Moriah	Chicoine	89 (2nd author)
	Megan	Nally	55
	Albert	Schrimp	79 (2nd author)
	Austin	Paul-Orecchio	73
	Michelle	Yadrick	89
2	Nathan	Altman	84 (2nd author)
	Edward	Beaumont	43
	Adam	Bert	54
3	Michael	Bennett	23
	Luca	Brambilla	76 (2nd author)
	Courtney	Carter	31
	Jamie	Cook	92
	Bret	MacIver	15 (2nd author)
	Thomas	Nagy	61
	Isaiah	Selmon-Miller	44
4	Linda	Hall	33
5	Joshua	Burnette	76
	Adam	Oldaker	12
6	Chana	Patterson	77
10	Nima	Shahab Shahmir	5
13	Kelsey	Allbright	85
	Danford	Smith	13 (3rd author)
14	Caroline	Leadmon	38 (2nd author)
15	Kristen	Brown	30
	Brandon	Duke	2
	Sierra	Portillo	9 (2nd author)
	Benjamin	Thompson	53
16	David	Hannan	72
	Jessica	Johnson	57
	Ian	Perry	59
	Adam	Roberts	65
	Derek	Staley	35 (2nd author)
17	Kathryn	Blethen	24
	Shelby	McKeand	41
	Anabella	Pauley	49 (2nd author)
	Harlee	Pauley	34
19	Bradley	Muncy	95
20	Jacob	Staggs	35
22	Kelcie	Clay	57 (2nd author)
	Martha	Ellis	58
	Andrew	McGrady	71
23	Ally	Brown	39

	Jacob	Mosteller	68
24	Mardigon	Toler	3 (2nd author)
27	James	Corvin	56
	Austin	Peek	9
28	Jeremy	Wood	26
30	Chelsea	Wallen	87
31	Rachel	McCoy	47
32	Hunter	Aliff	74
	Terry	Foster III	14
	Cameron	McNeely	70
33	Matthew	Boothe	63
34	Jessi	Tyo	38
35	Carrie	Digman	28
	Stacie	Hall	88
	Vishnupriya	Kasireddy	49
	Morgan	King	8 & 10 (2nd author)
	Krisha	Redillas	32
	Steven	Rollins	72 (2nd author)
	Jeff	Thompson	62 (3rd author)
36	Samantha	Belcher	51
	Doug	Bright	50 (2nd author)
	Edgar	Lopez	46 (2nd author)
	Ryan	Patrick	81 (3rd author)
	Carrissa	Sellards	86
37	Jessie	Bowlin	62
	Dylan	Jayasuriya	52
	Jonathan	Musselwhite	13
	Ryan	Patrick	81 (3rd author)
	Victoria	Ramey	46
38	Oddai	Gharib	45
	Geoffrey	Samples	65 (3rd author)
	Jaime	Veronda	13 (2nd author)
39	Asia	Petitte	21
	Josh	Rawson	59 (2nd author)
40	Briana	Haas	60 (2nd author)
	Ciera	Moles	60 (2nd author)
	Patrick	Shinn	2 (2nd author)
42	Corbin	Adkins	4
	Gregory	Hughes	3
43	Hannah	Nelson	69
	Scott	Wentz	40
46	Kelly	Weaver	20
47	Carinna F.	Ferguson	91
48	Ahmed	Haque	10
	Cody	Kropp	57 (3rd author)

	Candice	Travis	82 (2nd author)
49	Tyler	McGee	1
	Karagan	Mulhall	48
	Elizabeth	Satterfield	27
50	Rodney	Elliott	36
	Kayla	Plauger	81
	Amber	Trickett	82
51	Gabriella	Agazie	37 (2nd author)
	Willie	Beeson	6
	Claire	McDonald	17
	Maggie	Ruckle	90 (3rd author)
	Audrey	Weiss	84
	Alexis	Zini	10
54	Trevor	Johnson	11
	Olivia	Young	37
55	Trinity	Shaver	78
	Taija	Thomas	93
59	Hannah	Coffey	90
	Kaity	Foster	94
65	Ashley	Tyler	8 (3rd author)
66	Kelsey	Eackles	90 (2nd author)

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

Senate #	Participant		Poster #
1	Moriah	Chicoine	89 (2nd author)
	Megan	Nally	55
	Austin	Paul-Orecchio	73
	Michelle	Yadrick	89
	Edward	Beaumont	43
	Adam	Bert	54
	Courtney	Carter	31
	Thomas	Nagy	61
	Isaiah	Selmon-Miller	44
	Albert	Schrimp	79 (2nd author)
2	Linda	Hall	33
	Matthew	Boothe	63
	Glenna	Brown	58 (2nd author)
	Tyler	McGee	1
	Maggie	Ruckle	90 (3rd author)
3	Luca	Brambilla	76 (2nd author)
	Bret	MacIver	15 (2nd author)
4	Kelsey	Allbright	85
	Kristen	Brown	30

	First	Last	Number
	Brandon	Duke	2
	Caroline	Leadmon	38 (2nd author)
	Geoffrey	Samples	65 (3rd author)
	Benjamin	Thompson	53
	Oddai	Gharib	45
	Jaime	Veronda	13 (2nd author)
5	Joshua	Burnette	76
	Adam	Oldaker	12
	David	Hannan	72
	Bradley	Muncy	95
	Ian	Perry	59
	Annabella	Pauley	49 (2nd author)
	Adam	Roberts	65
	Derek	Staley	35 (2nd author)
	Shelby	McKeand	41
6	Michael	Bennett	23
	Chana	Patterson	77
	Jacob	Staggs	35
	James	Corvin	56
	Austin	Peek	9
7	Kelcie	Clay	57 (2nd author)
	Jessica	Johnson	57
	Martha	Ellis	58
	Andrew	McGrady	71
	Ally	Brown	39
	Jacob	Mosteller	68
8	Harlee	Pauley	34
	Hunter	Aliff	74
	Stacie	Hall	88
	Jonathan	Musselwhite	13
	Asia	Petitte	21
	Jessie	Bowlin	62
	Sierra	Portillo	9 (2nd author)
	Josh	Rawson	59 (2nd author)
	Patrick	Shinn	2 (2nd author)
	Danford	Smith	13 (3rd author)
9	Jamie	Cook	92
	Chelsea	Wallen	87
	Rachel	McCoy	47
	Mardigon	Toler	3 (2nd author)
10	Nima	Shahab Shahmir	5
	Jeremy	Wood	26
	Terry	Foster III	14
	Cameron	McNeely	70
	Corbin	Adkins	4

	Gregory	Hughes	3
11	Hannah	Nelson	69
	Scott	Wentz	40
	Trevor	Johnson	11
	Trinity	Shaver	78
12	Ahmed	Haque	10
	Cody	Kropp	57 (3rd author)
	Candace	Travis	82 (2nd author)
	Jessi	Tyo	38
	Kelly	Weaver	20
13	Gabriella	Agazie	37 (2nd author)
	Karagan	Mulhall	48
	Rodney	Elliott	36
	Amber	Trickett	82
	Willie	Beeson	6
	Claire	McDonald	17
	Audrey	Weiss	84
	Alexis	Zini	10
14	Carinna F.	Ferguson	91
	Elizabeth	Satterfield	27
	Kayla	Plauger	81
	Olivia	Young	37
	Taija	Thomas	93
15	Hannah	Coffey	90
16	Kelsey	Eackles	90 (2nd author)
	Kaity	Foster	94
	Ashley	Tyler	75 (3rd author)
17	Kathryn	Blethen	24
	Carrie	Digman	28
	Vishnupriya	Kasireddy	49
	Morgan	King	8
	Krisha	Redillas	32
	Carrissa	Sellards	86
	Victoria	Ramey	46
	Samantha	Belcher	51
	Dylan	Jayasuriya	52
	Nathan	Altman	84 (2nd author)
	Doug	Bright	50 (2nd author)
	Briana	Haas	60 (2nd author)
	Morgan	King	10 (2nd author)
	Edgar	Lopez	46 (2nd author)
	Ciera	Moles	62 (2nd author)
	Steven	Rollins	72 (2nd author)
	Ryan	Patrick	81 (3rd author)
	Jeff	Thompson	62 (3rd author)

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

State/ Country	Participant		Poster #
California	Leslie	Garcia	52 (2nd author)
Connecticut	Christie	Carroza	25
Kentucky	Jason	Lykins	65 (2nd author)
Michigan	Michael	Scott	15
New Hampshire	Emily	Silvestri	74 (2nd author)
New Jersey	Nicole	Flesche	28 (2nd author)
	Saad	Wasee,	63 (2nd author)
	Bryan	Swauger	17 (2nd author)
Ohio	Christopher	Roach	64
	Edwina	Barnett	50
	Christian	Hushion	7
	Chad	Meadows	42
	Josh	Ricket	60
	Chris	Roach	2 (2nd author)
	Kelsi	Settle	29
	Sasha	Sampson	81 (2nd author)
Pennsylvania	Carmine	Parascandola	66
	Tessa	Shaffer	75 (2nd author)
	Rachel	Wattick	83
Tennessee	Kendra	Monnin	18
Virginia	Angel	Biskner	6 (2nd author)
	Geoffroy	Gauneau	16
Victoria, Australia	Matthew	Siomos	19
Unknown	Emily	DeTemple	61 (2nd author)
	Dustin	Freeman	10 (3rd author)
	Sydney	Hughes	88 (2nd author)
	Sean	Nforkah	15 (3rd author)
	Binxing	Zhu	78 (2nd author)

IV. PARTICIPANTS BY FIELD (first authors only)

Agriculture		Poster #
Nima	Shahab Shahmir	5
Harlee	Pauley	34

Astronomy		
Jacob	Staggs	35
Rodney	Elliott	36
Olivia	Young	37

Biochemistry		
Jessi	Tyo	38

Biology		
Kelly	Weaver	20
Asia	Petitte	21
Rachel	Tallman	22
Michael	Bennett	23
Ally	Brown	39
Scott	Wentz	40
Shelby	McKeand	41
Chad	Meadows	42
Edward	Beaumont	43
Isaiah	Selmon-Miller	44
Oddai	Gharib	45
Victoria	Ramey	46
Rachel	McCoy	47
Karagan	Mulhall	48
Vishnupriya	Kasireddy	49
Edwina	Barnett	50
Samantha	Belcher	51
Dylan	Jayasuriya	52
Benjamin	Thompson	53
Adam	Bert	54
Bradley	Muncy	95

Business		
Carrie	Digman	28

Chemistry		
Megan	Nally	55
James	Corvin	56
Jessica	Johnson	57

Martha	Ellis	58
Ian	Perry	59
Josh	Ricket	60
Thomas	Nagy	61
Jessie	Bowlin	62
Matthew	Boothe	63

Computer Sciences

Tyler	McGee	1
Brandon	Duke	2
Gregory	Hughes	3
Willie	Beeson	6
Christopher	Roach	64
Adam	Roberts	65

Education

Kelsi	Settle	29

Engineering

Corbin	Adkins	4
Christian	Hushion	7
Morgan	King	8
Austin	Peek	9
Alexis	Zini	10
Ahmed	Haque	10
Trevor	Johnson	11
Adam	Oldaker	12
Jonathan	Musselwhite	13
Terry	Foster III	14
Michael	Scott	15
Geoffroy	Gauneau	16
Carmine	Parascandola	66

English

Jeremy	Wood	26

Environmental Studies

Claire	McDonald	17
Nathaniel	Carlson	67
Jacob	Mosteller	68

Forensic Sciences

Hannah	Nelson	69

Geography/Geology

Cameron	McNeely	70
Andrew	McGrady	71

History

Elizabeth	Satterfield	27
Kristen	Brown	30
Courtney	Carter	31

International Studies

Kayla	Plauger	81

Mathematics

David	Hannan	72

Other

Kendra	Monnin	18 (Chemical Engineering)
Matthew	Siomos	19 (Biomed./Mech. Eng.)
Kathryn	Blethen	24 (Immun./Cell Biology)
Christie	Carroza	25
Krisha	Redillas	32 (Architecture)
Linda	Hall	33 (Comm. Ed. Disabilities)
Austin	Paul-Orecchio	73 (Biomedical)
Hunter	Aliff	74 (Biomedical)
Carson	Purcell	75 (Disability Research)
Joshua	Burnette	76 (Microbiology)
Amber	Trickett	82 (Community Health)
Rachel	Wattick	83 (Public Health)
Audrey	Weiss	84 (Educational Psychology)

Political Science

Kelsey	Allbright	85
Carrissa	Sellards	86

Psychology

Chana	Patterson	77
Trinity	Shaver	78
Sabrina	Soriano	79
Juan Pablo	Troconis Bello	80
Chelsea	Wallen	87
Stacie	Hall	88
Michelle	Yadrick	89

Hannah	Coffey	90
Carinna F.	Ferguson	91
Jamie	Cook	92
Taija	Thomas	93

Sociology

| Kaity | Foster | 94 |

V. PARTICIPANTS BY BROAD CATEGORY (first authors only)

Engineering		Poster #
Nima	Shahab Shahmir	5
Willie	Beeson	6
Christian	Hushion	7
Morgan	King	8
Austin	Peek	9
Alexis	Zini	10
Trevor	Johnson	11
Adam	Oldaker	12
Jonathan	Musselwhite	13
Terry	Foster III	14
Michael	Scott	15
Geoffroy	Gauneau	16
Claire	McDonald	17
Kendra	Monnin	18
Matthew	Siomos	19

Health Sciences

Kelly	Weaver	20
Asia	Petitte	21
Rachel	Tallman	22
Michael	Bennett	23
Kathryn	Blethen	24
Christie	Carroza	25

Humanities

Jeremy	Wood	26
Elizabeth	Satterfield	27

Other

Carrie	Digman	28
Kelsi	Settle	29
Kristen	Brown	30

Courtney	Carter	31
Krisha	Redillas	32
Linda	Hall	33

Sciences

Harlee	Pauley	34
Jacob	Staggs	35
Rodney	Elliott	36
Olivia	Young	37
Jessi	Tyo	38
Ally	Brown	39
Scott	Wentz	40
Shelby	McKeand	41
Chad	Meadows	42
Edward	Beaumont	43
Isaiah	Selmon-Miller	44
Oddai	Gharib	45
Victoria	Ramey	46
Rachel	McCoy	47
Karagan	Mulhall	48
Vishnupriya	Kasireddy	49
Edwina	Barnett	50
Samantha	Belcher	51
Dylan	Jayasuriya	52
Benjamin	Thompson	53
Adam	Bert	54
Megan	Nally	55
James	Corvin	56
Jessica	Johnson	57
Martha	Ellis	58
Ian	Perry	59
Josh	Ricket	60
Thomas	Nagy	61
Jessie	Bowlin	62
Matthew	Boothe	63
Christopher	Roach	64
Adam	Roberts	65
Carmine	Parascandola	66
Nathaniel	Carlson	67
Jacob	Mosteller	68
Hannah	Nelson	69
Cameron	McNeely	70
Andrew	McGrady	71
David	Hannan	72
Austin	Paul-Orecchio	73

Hunter	Aliff	74
Carson	Purcell	75
Joshua	Burnette	76
Chana	Patterson	77
Trinity	Shaver	78
Sabrina	Soriano	79
Juan Pablo	Troconis Bello	80
Bradley	Muncy	95

Social Sciences

Kayla	Plauger	81
Amber	Trickett	82
Rachel	Wattick	83
Audrey	Weiss	84
Kelsey	Allbright	85
Carrissa	Sellards	86
Chelsea	Wallen	87
Stacie	Hall	88
Michelle	Yadrick	89
Hannah	Coffey	90
Carinna F.	Ferguson	91
Jamie	Cook	92
Taija	Thomas	93
Kaity	Foster	94

Technology

Tyler	McGee	1
Brandon	Duke	2
Gregory	Hughes	3
Corbin	Adkins	4

VI. PARTICIPANTS BY INSTITUTION (first authors only)

Bethany College		Poster #
Megan	Nally	55
Austin	Paul-Orecchio	73
Kelsi	Settle	29

Bluefield State College

Michael	Bennett	23
James	Corvin	56

Concord University

Cameron	McNeely	70
Chana	Patterson	77
Jeremy	Wood	26

Fairmont State University

Jessica	Johnson	57
Tyler	McGee	1
Hannah	Nelson	69
Kayla	Plauger	81
Amber	Trickett	82

Glenville State College

Ally	Brown	39
Kelly	Weaver	20
Scott	Wentz	40

Marshall University

Kristen	Brown	30
Joshua	Burnette	76
Brandon	Duke	2
Martha	Ellis	58
David	Hannan	72
Vishnupriya	Kasireddy	49
Shelby	McKeand	41
Chad	Meadows	42
Bradley	Muncy	95
Ian	Perry	59
Christopher	Roach	64
Adam	Roberts	65
Jacob	Staggs	35
Chelsea	Wallen	87

University of Charleston

Kelsey	Allbright	85
Stacie	Hall	88
Jacob	Mosteller	68
Asia	Petitte	21
Carrissa	Sellards	86

West Liberty University

Edward	Beaumont	43

Adam	Bert	54
Courtney	Carter	31
Linda	Hall	33
Thomas	Nagy	61
Isaiah	Selmon-Miller	44
Michelle	Yadrick	89

West Virginia State University

Hunter	Aliff	74
Edwina	Barnett	50
Samantha	Belcher	51
Jessie	Bowlin	62
Oddai	Gharib	45
Dylan	Jayasuriya	52
Jonathan	Musselwhite	13
Harlee	Pauley	34
Victoria	Ramey	46
Josh	Ricket	60
Benjamin	Thompson	53

West Virginia University

Willie	Beeson	6
Kathryn	Blethen	24
Matthew	Boothe	63
Nathaniel	Carlson	67
Christie	Carroza	25
Hannah	Coffey	90
Carrie	Digman	28
Rodney	Elliott	36
Carinna F.	Ferguson	91
Kaity	Foster	94
Christian	Hushion	7
Morgan	King	8
Rachel	McCoy	47
Claire	McDonald	17
Andrew	McGrady	71
Karagan	Mulhall	48
Carmine	Parascandola	66
Austin	Peek	9
Carson	Purcell	75
Krisha	Redillas	32
Elizabeth	Satterfield	27
Trinity	Shaver	78
Rachel	Tallman	22
Taija	Thomas	93

Jessi	Tyo	38
Rachel	Wattick	83
Audrey	Weiss	84
Olivia	Young	37
Alexis	Zini	10

West Virginia University Institute of Technology

Corbin	Adkins	4
Jamie	Cook	92
Terry	Foster III	14
Geoffroy	Gauneau	16
Gregory	Hughes	3
Trevor	Johnson	11
Kendra	Monnin	18
Adam	Oldaker	12
Michael	Scott	15
Nima	ShahabShahmir	5
Matthew	Siomos	19

Wheeling Jesuit University

Sabrina	Soriano	79
Juan Pablo	Troconis Bello	80

Capitol Rotunda Layout, 2018 Undergraduate Research Day at the Capitol

Byrd
Statue

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75 76   79 80   83 84   87 88   91 92   95 96
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27 28   31 32   35 36   39 40   43 44   47 48

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51 52   55 56   59 60   63 64   67 68   71 72
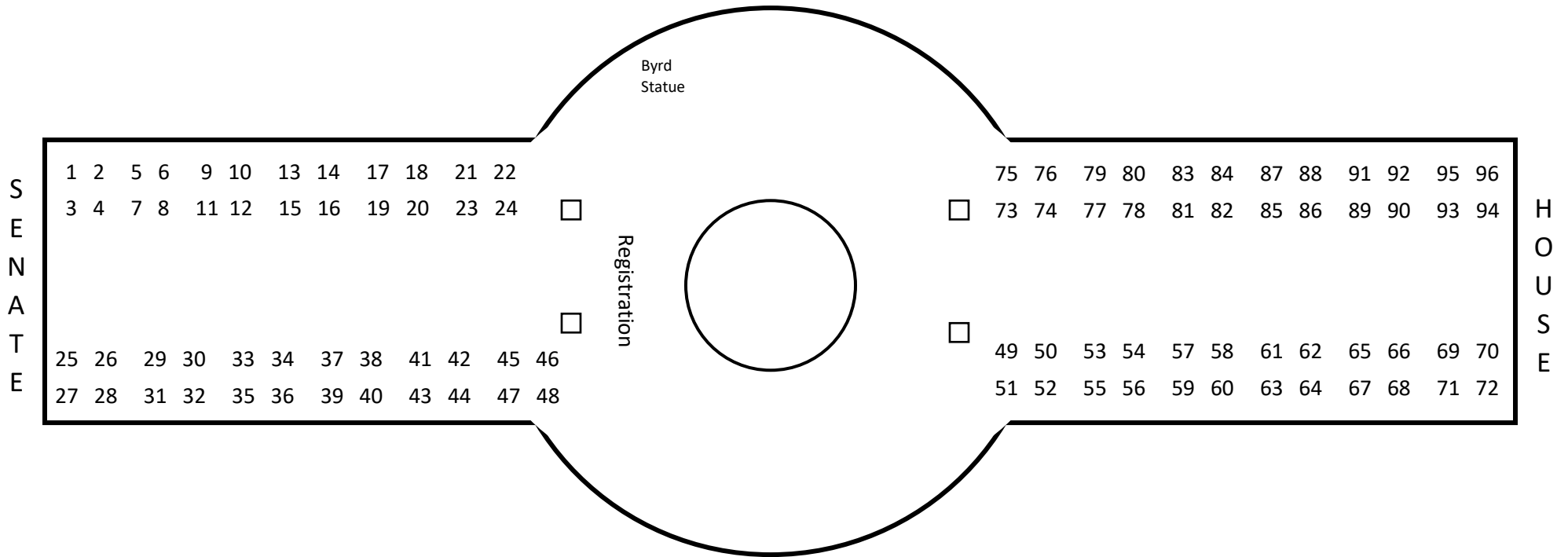
TECHNOLOGY

1. Leveraging Common Vulnerabilities in Bluetooth for Security Intelligence Gathering and Forensics

Tyler McGee (Taylor County, WV)

Institution: Fairmont State University
Field: Computer Science
Faculty Advisor: Marcus Fisher

Recently the world was exposed to the latest vulnerability with Bluetooth communications, BlueBorne. The attack makes all devices, whether their Bluetooth is connected to something or not, vulnerable to hackers. The vulnerability is somewhat complex and all the details have yet to be revealed. The purpose of this research is to explore and understand the vulnerabilities in Bluetooth communications in order to extract security intelligence from devices that are not accessible.   For example, digital assets are confiscated all the time during investigations and some of these devices are not able to be forensically analyzed because the individual under investigation will not unlock their device. This research proposes that the device will not need to be unlocked in order to gain access to the contents of the device and the vector for gathering security intelligence will utilize the vulnerabilities with Bluetooth such as remote code execution and man in the middle attacks.

Funding: Institutional (Fairmont State University)

2. Flood Detection Using a Wireless Arduino based Network

Brandon Duke (Putnam County, WV); Patrick Shinn (Kanawha County, WV); Chris Roach (Ohio)

Institution: Marshall University
Field: Computer Sciences
Faculty Advisor: Haroon Malik

Flash flooding is a very sudden, destructive natural disaster due to its severity and unpredictability. Per the National Oceanic and Atmospheric Administration (NOAA), in the United States the national 30-year average for flood deaths is 127 a year. What if we could find a way to detect flooding and warn those in the area? That is the purpose of this project, to propose a way to develop a network of cheap and effective wireless sensor platforms capable of detecting rapid changes in water level. These platforms will provide real time data on the current state of a location, or body of water in which they are deployed. Through the collection of this information we will be able to provide an early warning system for flooding in the affected area. Thus, the ability to save lives and property, as the most disastrous part of flash flooding is the lack of time to prepare.

Funding: Federal (NASA West Virginia Space Grant Consortium)

3. Generating Concurrent Musical Accompaniment using Artificial Intelligence

Gregory Hughes (Greenbrier County, WV); Mardigon Toler (Wyoming County, WV)

Institution: West Virginia University Institute of Technology
Field: Computer Science
Faculty Advisor: Sanish Rai

One of the most impressive feats of musical performance is improvising while playing with another musician. We present an Artificial Intelligence (AI) agent that emulates this feat by playing music alongside a real musician as if it were also another musician. While a simple melody is being played in a predetermined key and time signature, the AI agent generates a simple melody in the same key and time signature using a genetic algorithm. The notes from the melody are stored in a custom data structure that reaches full capacity after approximately around 12 notes. Once the structure is full, several possible accompaniments, called individuals, of the same size are randomly generated and then merged based on an evaluation of how well they sound when contrasted with the input melody. Using the genetic algorithm, the best-sounding individuals that synchronize with the input melody are more likely to be created. The best individual to emerge from multiple rounds of merging and the occasional mutation is then played while next notes are being recorded. The result is a computer-generated melody that plays with the accompanying tune in harmony. There are existing programs that generate musical accompaniment, but the significance of this approach is its ability to generate music in real time during a musical performance, making it an interesting tool for use in both practice and performance.

4. The Connected Vehicle Project: Location Aware Mesh Network for Vehicle Navigation and Collision Avoidance

Corbin Adkins (Greenbrier County, WV)

Institution: West Virginia University Institute of Technology
Field: Engineering
Faculty Advisor: Ming Lu

A solution has been developed to improve collision avoidance in driver controlled and autonomous vehicles using an embedded mesh network of location-aware self-healing nodes. Our network has been prototyped and tested on a small cluster of vehicles, and has proven effective at quickly tracking the location of otherwise obfuscated vehicles in the near vicinity of the client. It transmits encrypted location data across a short range 5.8GHz high-frequency network, and relays information from surrounding nodes forward, allowing a large enough network of connected vehicles to pass location data across long distances, without the need for high powered transmission. The software handles all low-level functions, including node management/balancing, transmission and packet assembly, and data retrieval and management, allowing the host software to easily retrieve node lists and data sets gathered from the network. This system is designed to be used in conjunction with existing vehicle control and safety systems to improve the sensory input and potentially prevent "blind corner" collisions that traditional sensor arrangements struggle to detect.

ENGINEERING

5. Beneficial mushroom material instead of plastics

Nima Shahab Shamir (Greenbrier County, WV)

Institution: West Virginia University Institute of Technology
Field: Agriculture
Faculty Advisor: Nora Myers

My research included learning about mushroom different species and understanding natural qualities of their basic structure. We have been using plastic and Styrofoam materials for a long time and not recycling most of its trash as it is supposed to be. That is why thousands of pounds of it are ending up in the landfills or in the oceans across the globe. It takes a long time for plastic elements to biodegrade sometimes more than 300 years for a simple plastic bottle to be naturally broken down. I have found a need for a different substance to be used instead of plastic family that will have a faster degrading stage with lots of positive benefits. Growing marketable products from mushroom takes only couple of weeks and they will naturally biodegrade in less than a month. The interesting fact here is that once they do degrade, lots of useful nutrients for the soil are left behind and I believe this process can be beneficial for farming industry as well.

6. Classifying thoughts in EEG data using support vector machine learning

Willie Beeson (Monongalia County, WV); Angel Biskner (Virginia)

Institution: West Virginia University
Field: Computer Sciences
Faculty Advisor: Frances VanScoy

Electroencephalography (EEG) headsets, being highly portable, present a convenient, noninvasive method of recording the brain's electrical activity. We seek to develop a method for the classification of thoughts, memories, and stimuli from EEG data, for potential use in brain-computer interface (BCI), and the treatment of Aphasia and disabilities that affect verbal communication. The Emotiv EEG headset contains 14 electrodes, manifesting data as 14-D time series. For analysis of multidimensional data, we adopted support vector machine (SVM) learning algorithms to train models in the classification of event-related potentials corresponding to predetermined thoughts. Simple, tangible things that provoke distinct sensations, like pizza toppings, are more universal and easily conceived, making them suitable classifications for our study. SVMs are fed EEG recordings of subjects imagining a topping, forming a classifier model based on the data's spatial and temporal configurations. This model is then able to classify events given new EEG data, and stochastic neighbor embedding allows visualization of the 14-dimensional data in 2-D. We aim to reduce noise while preserving electrical behavior by expanding analysis to interval centroids of the time series. Technology enabling nonverbal communication is exciting not only for its futurist appeal, but its potential to help millions suffering from Aphasia and other speech impairments. While methods such as MRI capture data with extreme resolution, EEG headsets would provide a noninvasive, inexpensive and accessible means of translating brain activity. We therefore hope our research will contribute to the future development of an EEG based BCI for therapeutic and rehabilitative purposes.

7. Emissions Analysis of Synthetic Diesel for Off-Road Heavy-Duty Equipment

Christian Hushion (Ohio)

Institution: West Virginia University
Field: Engineering
Faculty Advisor: Arvind Thiruvengadam

The objective of the research is to evaluate the effect of renewable and gas-to-liquid (GTL) diesel on gaseous and particulate matter emissions of an off-road diesel-powered machine. The results from the evaluation will be compared against emissions data obtained using ultra-low sulfur diesel. The off-road equipment that will be tested will include a back-up generator and a heavy-duty dozer. GTLs are processes to convert fossil fuels into larger hydrocarbons. The conversion is done via the Fischer-Tropsch (FT) process. The FT process breaks apart the fossil fuels into key components of hydrocarbons; hydrogen and carbon monoxide. The mixture is cleaned to remove undesirable elements and compounds, such as sulfur. Then a combination reaction is performed, which allows for manufacturing of various hydrocarbons. Renewable diesel is a form of synthetic diesel that is produced from biomass including recycled fats and oils. Renewable diesel is proven to reduce the net GHG profile during fuel manufacturing and combustion. West Virginia is one of the largest fossil fuel producers in the United States. Production of liquid fuels can be a promising pathway to safeguard national energy security. Synthetic diesel can be advantageous for off-road equipment because of the low fuel demand and simplified engine subsystems. The study will conduct a detailed emissions analysis of Tier 3 diesel engines fueled by conventional diesel and two synthetic diesels. Emissions of CO, CO_2, oxides of nitrogen (NOx), hydrocarbons, and soot will be measured. Fuel consumption will be a key parameter to compare the performance between the fuels.

8. Tap into Water Justice for West Virginia

Morgan King (Kanawha County, WV)

Institution: West Virginia University
Field: Engineering
Faculty Advisor: Lance Lin

Water insecurity is an issue most often associated with developing countries. Until the crisis in Flint, Michigan few realized its presence in the United States. The issue is further overlooked in West Virginia. Thirteen communities operate officially under the status of "abandoned" water systems in the state. This ongoing water crisis occurs across Appalachia where abandoned systems distribute untreated water to homes via outdated infrastructure without the oversight of an operator. Notably, all of these abandoned water systems in West Virginia exist in the southern part of the state, in "coal country." Through a case study in Prenter, WV by the WVU Chapter of Engineers Without Borders the impact of the abandoned water system in the community was assessed. The findings indicated the exodus of coal companies from Appalachia and the malpractices of the remaining coal industry on clean water are inherently connected. Further research was performed on records of phone logs of the National Environmental Services Center at West Virginia University between the years 2010 until its closure in 2016. There are still critical needs unmet surrounding technical advice in the water and wastewater fields for the public, including community public service districts, which WVU can provide.
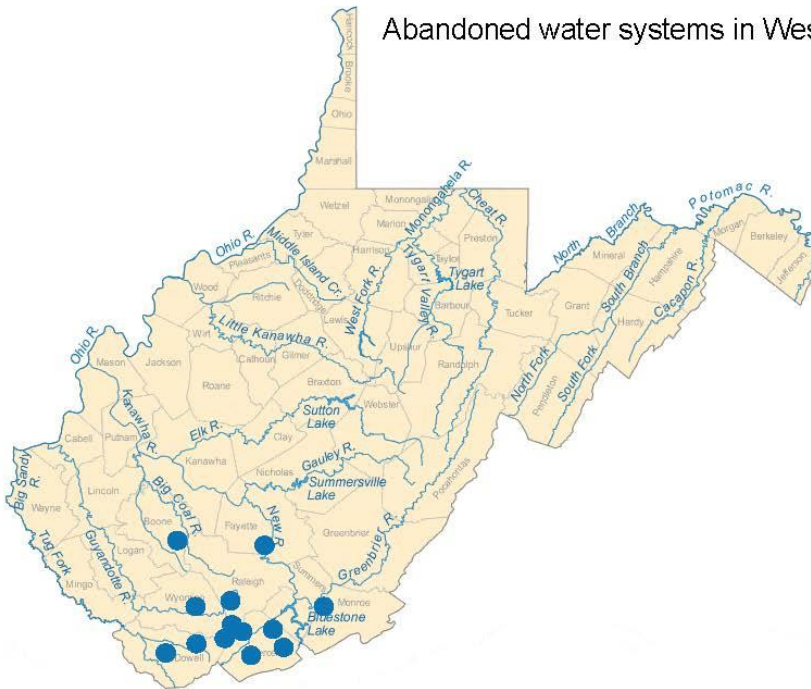
Abandoned water systems in West Virginia

PWS Name	County
Prenter Water	Boone
Kanawha Falls Community Water	Fayette
Otoole Water	McDowell
Keystone Municipal Water	McDowell
Hiawatha Water	Mercer
Weyanoke Giatto Water	Mercer
Pinnacle Water	Mercer
The Village at Rock Ridge Water	Summers
Coal Mountain Water	Wyoming
Herndon Community Water	Wyoming
Pierpont Water	Wyoming
Herndon Heights	Wyoming
Garwood Community Water	Wyoming

9. Mountaineers Take On Microgravity

Austin Peek (Mercer County, WV); Sierra Portillo (Putnam County, WV); Bryan Swauger (New Jersey)

Institution: West Virginia University
Field: Engineering
Faculty Advisor: John Kuhlman

The future of space exploration relies heavily on the interior hardware and electronics of spacecrafts. On Earth, there are several common techniques for repairing these electronics, specifically soldering. However, in space, adjustments must be made to account for zero-gravity conditions. This project explores different magnetic solder pastes, in an attempt to remove flux vapor bubbles from solder joints. A solder joint is the term for the connection between an electronic component, such as a resistor, and a circuit board. Bubbles and voids weaken the strength of soldering joints, as well as the electrical conductivity. This impacts how electrical circuits, hardware, and other robotic components onboard the spacecraft function. With funding from the NASA USIP award NNX16AL83A, we can perform real-time experiments in a Zero-Gravity airplane. The team consists of eleven undergraduate students, one graduate assistant, and one advisor, Dr. John Kuhlman. We plan to test several soldering methods in the presence of a strong magnetic field and compare the strength and conductivity of resulting solder joints. If the team successfully develops a magnetic solder paste, organizations such as NASA will no longer need to include spare electronic boards on spacecrafts, which will reduce the mass and cost of launch missions. Results from these experiments will provide valuable insight on repairing electronics in zero-gravity conditions. With the current trend in NASA's budget, cost efficiency is crucial for future missions.

Figure 1: Zero-Gravity aircraft for test flight

Figure 2: Conventional soldering test apparatus
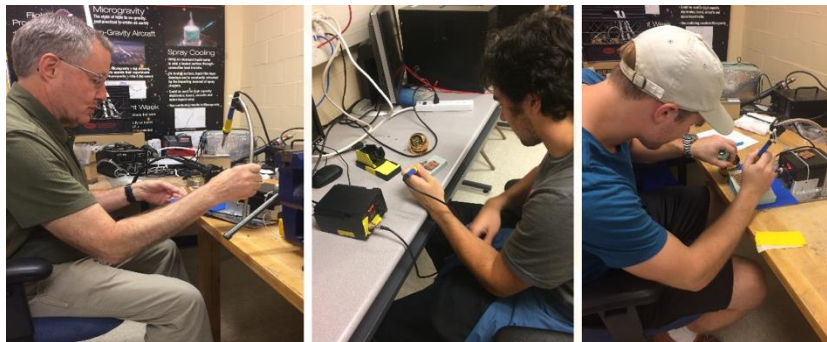
Figure 3: Members of the team practice soldering techniques in the lab

10. Safe Water Supply Design for the Ugandan Village of Kabughabugha

Ahmed Haque (Harrison County, WV); Alexis Zini (Monongalia County, WV); Morgan King (Kanawha County, WV); Dustin Freeman (Monongalia County, WV)

Institution: West Virginia University
Field: Engineering
Faculty Advisor: Lance Lin

Villagers of Kabughabugha within the mountainous Rwenzori Region of Kasese, Uganda, often walk three to five kilometers to access a natural spring. The inherent connection of water inequities to inequalities of gender, health, education, and economic development are evident in this village. The West Virginia University Chapter of Engineers Without Borders partnered Rwenzori Rural Health Services to develop a project to assess water quality and supply, local geography and terrain, and demographics of Kabughabugha. The aim of this assessment was to develop a sustainable water solution for the implementation of a water access pipeline. Through data collection in the field, a water system that consists of a gravity flow pipe network, water storage, treatment, and a distribution network was designed to improve water quality and collection accessibility. The design and implementation of a water supply and treatment system will provide a more accessible water supply. The assessment findings also indicated that the greatest water contamination impacts were human-induced through poor sanitation and hygiene practices in the village. WASH educational programming should be implemented to promote sustainable sanitation and hygiene practices for sustainably managing this water supply to mitigate the spread of waterborne diseases.

11. Redesign of Molten Aluminum Refractory for Longevity

Trevor Johnson (Pendleton County, WV)

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

In the aluminum industry, the biggest cause of production stoppage and downtime is the repair or replacement of refractory in the melting furnaces. Refractory is a concrete like material that retains its strength and properties at high temperatures. In the melting furnace, it is used to protect the steel shell from the hot and corrosive elements of molten aluminum and its alloys. There are several problems that affect the life of the melting furnace's refractory at Constellium's Ravenswood plant: the impact from charging solid metal, constant temperature cycling, and damage caused by stirring. When a furnace's refractory fails, it requires at least 3 weeks to replace it. It can be repaired for smaller failures or defects. These issues are the biggest reason for loss of production.   This project consists of analyzing, researching, and testing different refractory materials, types of installation, and maintenance procedures for the refractory in DC-2's melting furnace. This requires researching the material properties of different refractories, working with the manufacturers, and field testing the different designs. Financial planning, design implementation, and hands on testing will all be taken into consideration. Engineers at Constellium as well as material/refractory engineers at various refractory manufactures are providing input and recommendations on materials, additives, and procedures for installing, baking out, and repairing the refractory. The main focus is on how to change the properties of the refractory to achieve a longer life in the real world conditions experienced at Constellium.

12. WVU Tech Campus Traffic Study

Adam Oldaker (Cabell County, WV)

Institution: West Virginia University Institute of Technology
Field: Engineering
Faculty Advisor: Amr Mohammed

The purpose of this research is to better improve the flow of vehicular and pedestrian traffic in and around the new Beckley campus of West Virginia University Institute of Technology, in addition to promoting ideas for pedestrian safety across the campus. There have been several safety concerns and hazards at different areas around the campus. An obvious example of a safety concern is the State Highway 210, which pass adjacent to most of the WVU-Tech campus buildings. The roadway, WV 210, seems to be an area of congestion for vehicles as students continuously cross the road, and this denotes it the most unsafe road around campus. Furthermore, multiple roadways leading to this roadway yield dangerous intersections with other safety problems, such as poor sight distances. The researchers, therefore, collected traffic safety data reports for the Beckley area, in addition to collecting our own Traffic counts (average daily traffic, peak-hour factors, and pedestrian volumes) by means of state-of-the art traffic video recorders. All were collected at several major entry and exit points around the campus. These datasets, along with traffic safety research of surrogate (proactive) measures of safety, provide the researchers with ideas of countermeasures of safety, which improve the operations of the campus transportation network. Engineering solutions were generated to help find a more permanent solution to the transportation problems on campus and give future work for student projects aimed at solving these traffic issues around the campus and across the City of Beckley.

13. WVSU Participation in the NASA's Space Flight Design Challenge 2017

Johnathan Musselwhite (Kanwha County, WV); Jaime Veronda (Putnam County, WV); Danford Smith (Putnam County, WV)

Institution: West Virginia State University
Field: Engineering
Faculty Advisor: Marek Krasnansky

Last year West Virginia State University (WVSU) participated in the NASA IV&V Space Flight Design Challenge (SFDC) together with other WV universities as the West Virginia Coalition. The purpose of the SFDC is to provide students with hands-on experience designing and building experiments to be launched into suborbital flight. The goal of WVSU's experiment was to measure radiation levels, flight dynamics, magnetic field strength, ozone concentrations, and test the limits of a consumer-grade GPS unit. The radiation levels were measured with a Geiger counter while three Si PIN photodiode particle detectors were used to determine the direction of radiation. Flight dynamics, such as acceleration and rotational velocity, and magnetic fields, were measured by an Inertial Measurement Unit (IMU). All measurements were controlled by a Raspberry Pi Zero, which collected and stored the data on its microSD Card. The rocket was launched from Wallops Flight Facility in Virginia in August 2017.

14. J.Q. Dickinson Salt Separator

Terry Foster III (Fayette County, WV)

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

The J.Q. Dickinson Salt Works is a local business located in Malden, West Virginia that produces a gourmet cooking salt from natural processes. Some of the processes the salt goes through can be fairly labor intensive. One process that significantly stands out is sifting the crystals. When salt forms naturally, the crystal size varies. Some will be as small as everyday table salt, others will be a half inch square. The current methods for sifting is a window screen suspended from the ceiling with a catch bin underneath. A scoop of salt is placed on the screen and manually shaken until the crystals have separated. This process must be done twice as the salt can be sold in three different sizes. This project will be to create a motorized or easily human-powered sifter that can separate three crystal sizes from one inlet. The machine needs to be made entirely out of corrosion resistant materials as salt itself is highly corrosive. The sifting screens need to be interchangeable and the machine needs to have an adjustable speed setting. This project would be considered a success if the time spend sifting a five-gallon bucket of raw salt manually by human power is reduced by 50%.

15. Gestamp: Off-Gauging Failure Modes Effects Analysis

Michael Scott (Michigan), Bret Maclver (Wood County, WV); Sean Nforkah

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

The process of hot stamping, also called press hardening, is a complex fully automated method of shaping and strengthening metal often used to make automotive parts. The process starts with a thin precut blank steal sheet which is fed into an oven at 960°C for 3-6 minutes. After baking it is picked up and placed on a die which then stamps the blank into a three-dimensional quench hardened part. A common problem across the hot stamping manufacturing industry, called off-gauging, occurs when the heated sheet of metal is placed incorrectly onto the die. When this occurs, the piece must be manually removed. If the process of removal takes too long, all the parts in the oven must be scrapped costing significant materials and manufacturing time. At Gestamp West Virginia, the current scrap rate is high at about 7%, of which off-gauging is the highest cause. To address this problem a failure mode effects analysis (FMEA) will be completed on the hot stamping process. The FMEA will include potential failure modes that will be assigned detectability, severity and, occurrence probability rankings. These rankings will be determined using data collected from the hot stamping lines at Gestamp West Virginia. Solutions to the top ranked failure modes will be devised and developed with the goal of producing solutions that will decrease the current scrap level at Gestamp West Virginia.

16. Hydraulic System for a Chainless Bicycle

Geoffroy Gauneau (Virginia)

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

The hydraulic system for a chainless bicycle is to be designed within the Fall semester and built in the Spring semester. It will be built on an actual bicycle that will have to be functional. The purpose of the system is to replace what chains do on a regular bicycle, which is transferring human power to the back wheel through the chains. The final product will be a bicycle that will be fluid powered, it means that the human power will be transferred to fluid power through a hydraulic pump than transferred to the back wheel through a hydraulic motor. The hydraulic circuit of the bicycle also must have several modes such as a charging mode, a pedaling mode, a boost mode, etc. The team will follow the National Fluid Power Association (NFPA) competition standards to design the hydraulic system and, also, follow the National Fluid Power Association's schedule. The final product will participate in a competition including other schools that are participating. The competition will be held in April.

17. Inferences from the Chronology of Dengue and Zika Outbreaks in Human Populations

Claire McDonald (Monongalia County, WV)

Institution: West Virginia University
Field: Environmental Studies
Faculty Advisor: Antarpreet Jutla

Dengue and Zika viruses are increasingly becoming global health threats. With a recent resurgence of Zika virus in the Americas, there is a renewed interest to understand the physical pathways between the interactions of vectors and the human population. *Aedes spp*. mosquitoes are the primary vector for both dengue and Zika viruses. In order to understand how one species of mosquito is able to transmit two diseases, further investigation must go into the co-emergence behavior of dengue and Zika infections. This project looks at the emergence of Zika virus in South America and compares it to the fluctuation of dengue cases over the same time-period. Zika virus infections occurred in areas already infected with dengue, emerging when the area was experiencing a dengue outbreak. These results can be used concurrently with the environmental and climatological conditions believed to influence mosquito populations to better help predict the spread of Zika virus.

18. Composites of Nanoporous Silica and Commercial Adsorbents for Carbon Dioxide Capture

Kendra Monnin (Tennessee)

Institution: West Virginia University Institute of Technology
Field: Other (Chemical Engineering)
Faculty Advisor: Gifty Osei Prempeh

Carbon dioxide adsorption of nanoporous silica incorporated into commercial adsorbents was studied. Nanoporous silica made within the pores of commercial adsorbents form composites that provide the potential to develop adsorbents with high surface area due to structured pores. The surfaces of the adsorbents are functionalized for specific applications. Amberlites® are commercially available adsorbents used for various separation processes. The Amberlite® polymer have large pores which can be functionalized for specific applications for example, carbon dioxide adsorption and water purification. Nanoporous silica-amberlite® composites were synthesized using tetraethyl orthosilicate, TEOS, impregnated Amberlite® IRA-forms as seed in cetyltrimethylammonium bromide, CTAB, templating sol-gel medium. The resulting composite material showed a high incorporation of silica ranging from 22% to 48% depending on the functional group added. Primary and tertiary amine functional groups were added to the composite synthesis to enhance the carbon dioxide adsorption capacity. The potential for the nanoporous silica-amberlite® composites with and without the amine functional groups for carbon dioxide adsorption will be highlighted in this presentation. Additionally, the composites have shown good gas transport and easy synthesis that can be applied directly to industry.

19. Development and Analysis of Tissue Scaffold for Artificial Tendon Applications

Matthew Siomos (Australia)

Institution: West Virginia University Institute of Technology
Field: Other (Biomedical/Mechanical Engineering)
Faculty Advisor: Bernhard Bettig

Tendons transfer forces and motion between parts of the body such as between two bones. Tendons can become damaged due to wear caused by vigorous exercise and from the development of diseases that affect the cellular structure and adhesion properties of tendons. Clinical treatments have been applied to regenerate tissue cells of tendons within the body. In tissue engineering research, tissue scaffolds have been regularly generated to allow natural cells from the body to attach and regenerate tissue replicating a native tendon.   The development of scaffolding design has been advanced with different computer-aided techniques that approach scaffolding design from a unit cell perspective, where both mechanical and biological requirements are considered. This project utilizes computer-aided techniques including CAD based-methods, triply periodic minimal surface methods (TMPS) and image based-design. Modifications have been proposed to generate scaffolds that function with high performance, mechanically and biologically by focusing on altering the porosity size of the cell via the use of algorithms. This research further is focused on the optimization of the scaffold by applying finite element analysis (FEA) and computational fluid dynamics (CFD) to simulate and quantitatively determine mechanical properties as well as observe the biological response to fluid flow.

HEALTH SCIENCES

20. Construction and Analysis of an Improved Bioluminescent Expression Vector in Gram-Negative Bacteria

Kelly Weaver (Lewis County, WV)

Institution: Glenville State College
Field: Biology
Faculty Advisor: Mariette Barbier

Bioluminescence is a naturally occurring phenomenon in living organisms such as fireflies, specific marine species, and some bacterial species. The family Vibrionaceae includes common bioluminescent bacteria that express luciferase. To produce light, the bacterial luciferase genes (luxCDABE) require flavin mononucleotide (FMNH2) as a substrate. Previously, it was shown that FMNH2 is a limiting factor for bioluminescence production. Flavin reductase P (Frp) shifts the intracellular equilibrium of FMN/FMNH2 toward the reduced state of FMNH2. The objective of this research is to produce a vector which can generate bioluminescence without substantial substrate limitation. For this purpose, we inserted the frp gene into the transposon vector pUC18T-mini-Tn7T-lux-Gm. Once constructed, the plasmid can be integrated into bacteria where the frp and luxCDABE genes will be transposed into the chromosome of the bacteria. In this study, we use *Pseudomonas aeruginosa* as the bacterial model organism. *P. aeruginosa* is an opportunistic pathogen responsible for many nosocomial infections ranging from mild to severe. Examples of individuals at high-risk for pseudomonal infections include those who spend extended periods of time in the hospital, those suffering from burn wounds, and contact lens wearers. The construct described in this study is hypothesized to enhance bioluminescence detection limits by enabling bacteria to produce more light in comparison to other constructs. This research is important because luminescence expression provides a novel method of tracking bacteria within in vivo models and will help better understand the pathogenesis of *P. aeruginosa*.

21. Tardigrades as Future Prevention and Treatment Plan in Burn Victims

Asia Petitte (Kanawha County, WV)

Institution: University of Charleston
Field: Biology
Faculty Advisor: Heather Arnett

Treatment and prevention of third degree burns has been a challenging task because it entails the complete loss of the ability to heal the burned skin. Treatment requires skin grafts which are relatively expensive, and donor skin must be available. The new skin never returns back to its original condition so visible scar tissue is normally present which poses an aesthetic concern. The goal of this experiment is to observe the integument damage of the Tardigrade after exposed to temperatures that would cause third degree burns in humans and track the healing process. As Tardigrade integument contains intrinsically disordered proteins which is one of the reasons they are extremophiles. Water containing Tardigrades was prepared and exposed to 100ºC temperatures for twenty-four hours. Pictures were taken of the Tardigrades over consecutive days to measure the shrinkage and flaking of the integument. I expect to assess an initial shrinkage due to desiccation followed by an expansion during the healing phase of approximately two weeks. Tardigrades will be able to heal their integument via intrinsically disordered proteins which create non-crystalline amorphous solids that allows the integument to return to normal condition. Also, I expect to assess the extent of flaking of the damaged integument. If Tardigrades are able to heal through expansion and smoothing after exposure, techniques can be further studied to extract intrinsically disordered proteins from Tardigrades and place them in human skin cells to prevent and treat severe burns which would not only improve the aesthetics but reduce pain and infection.

22. Comparative investigation of a novel chemotherapy for metastatic breast cancer of the brain

Rachel Tallman (Monongalia County, WV)

Institution: West Virginia University
Field: Biology
Faculty Advisor: Paul Lockman

Of the various types of cancer, tumors in the brain are among the most difficult to treat because of the inability of most chemotherapy to penetrate the blood-brain barrier (BBB), which acts as a filter that prevents toxins from entering. Consequently, there has been a push for the development of novel medications that can cross the BBB to reach tumors. In this study, the new agent NKTR-102 was compared to standard treatments used for breast cancer tumors that have spread to the brain. This was accomplished by injecting mice with metastatic breast cancer cells lines and administering chemotherapy. Overall survival and brain imaging data were collected to evaluate chemotherapeutic effects. NKTR-102 was superior in most models, but conventional chemotherapies had differing effectiveness among tumor models. This suggests that properties of the tumors associated with the cell lines may play a role in how effective a therapy is in treating it, highlighting the importance of personalizing medications on a case by case basis.

23. Proinflammatory cytokine production in human lung cell lines infected with *Pseudomonas aeruginosa*.

Michael Bennett (Mercer County, WV)

Institution: Bluefield State College
Field: Biology
Faculty Advisor: Tesfaye Belay

Pseudomonas aeruginosa is known to induce the production of proinflammatory cytokines by epithelial cells of the respiratory tract. The cytokines produced do not necessarily eradiate the opportunistic pathogen but if produced in excess, they can decrease the function of the lung and subsequently damage the lung. The objective of this study was to determine the production of proinflammatory cytokines by human and mouse cell lines using ELISA. We first determined the optimal numbers of cells and duration of infection in time-kinetics manner. Cytokine IL-1b, IL-6, IL-8 and TNF-a were selected as a marker of inflammation to determine their secretion in human and mouse cell lines. Both CCL-185 and ATTC-1845 cell lines infected with all strains secreted increased levels of proinflammatory cytokines and the anti-inflammatory cytokine IL-10 after 24 h of infection. The highest concentrations of all cytokines tested was 48 h post infection. Mucoid and non-mucoid strains of P. aeruginosa strains showed different cytokine production patterns in mouse cell lines. The results suggest that *P. aeruginosa* induces almost the same pattern of secretion of proinflammatory after 24 h of infection in human cells but irregular pattern of cytokine production was observed in the mouse cell lines tested.

24. Generation of Lung and Macrophage Cell Lines Using Four Core Mice and Human Papillomavirus

Kathryn Blethen (Kanawha County, WV)

Institution: West Virginia University
Field: Other (Immunology and Cell Biology)
Faculty Advisor: Rosana Schafer

It is well established that gender plays an important role in susceptibility to several diseases, including cancer, although the mechanisms responsible for the gender differences have not been well characterized. Males are at a higher risk not only to develop certain cancers, but often do not respond to treatment as well as females. One example is non-small cell lung cancers where the overall survival rate is twice as high in females than males. Recently the contribution of sex chromosomes in development of cancer has become a focus of study, as the X chromosome carries a number of genes associated with specific cancers. Studies into the role of sex chromosome complement have become feasible due to the development of the 4-core genotypes (FCG) model in mice, which consists of XX and XY gonadal females with ovaries (XXF and XYF) and XY and XX gonadal males with testes (XYM and XXM). This provides a model to determine the contribution of XX or XY sex chromosome complement to a given response. In order to study potential differences in the response of lung epithelial cells to chemotherapeutic agents in males and females, the present study was undertaken to transform lung epithelial cells and bone marrow derived monocytes from FCG mice using Human Papillomavirus Oncogenes E6 and E7 to establish permanent cell lines for future in vitro experiments.

25. PregPal, A Perinatal Weight Management Mobile Application

Christie Carroza (Connecticut)

Institution: West Virginia University
Field: Other
Faculty Advisor: Peter Giacobbi

Studies have shown that excess body fat during pregnancy is associated with increased risk of pregnancy complications, gestational diabetes, hypertension, pre-eclampsia, and several fetal impacts. The American College of Obstetrics & Gynecology recommends preconception counseling for weight reduction. Guided imagery has shown promising results in studies that addressed weight management. Guided imagery is a multi-sensory and conscious experience that resembles the actual perception of some object, scene, or event but occurs in the absence of external stimuli. Most studies using guided imagery are limited in reach by the use of in-person delivery as guided imagery. Likewise, intensive procedures are common in studies involving perinatal weight management because they involve face-to-face interactions with study personnel. Digital interventions using guided imagery offer potential to reach large numbers of pregnant women and reduce participant burden. This project uses guided imagery to help women with obesity and overweight manage weight gain during pregnancy. We developed a digital application, PregPal, that will be used over six weeks to expose overweight and obese pregnant women to guided imagery audio files designed to assist with behavior change for weight management. Formative efforts included interviews with pregnant women and mothers about their use of pregnancy applications which informed the design and user interface of PregPal. Feasibility indicators will include compliance with the protocol and participants views about the application while pre- and post-assessments will measure physical activity, food cravings, body image and depression/anxiety. After testing, we hope to disseminate PregPal to large numbers of pregnant women.

HUMANITIES

26. Sterne's Poststructuralist Hobby-Horse: The Flaws of Narrative in Tristram Shandy

Jeremy Wood (Summers County, WV)

Institution: Concord University
Field: English
Faculty Advisor: Michelle Gompf

Laurence Sterne's most studied novel Tristram Shandy is arguably one of the most ambitious novels of all time because it seeks to tell a "complete" story. The strangest aspect of Sterne's novel is that, while most narratives seemingly go from point "A" to "Z," Sterne's narrative does not. This could lead one to describe Tristram Shandy as disordered; however, this disorder may be interpreted as Sterne's criticism of a "complete" narrative. This raises the questions, where is point "A?" Is point "Z" beyond the scope of understanding because it reaches into infinity? How can a story be "complete" if beginning and ending points "A" and "Z" cannot be pinpointed? By exploring the development of narratology in relation to Tristram Shandy and the criticism associated with the novel, this essay argues that narratives are not "complete" because narratives as a whole are fundamentally subjective and incomplete. Keynotes: narratology, Tristram Shandy, poststructuralism, Laurence Sterne

27. A Changing Cultural Landscape in the Sunnyside Neighborhood of Morgantown, West Virginia

Elizabeth Satterfield (Taylor County, WV)

Institution: West Virginia University
Field: History
Faculty Advisor: Jenny Boulware

Although known in recent memory as a popular party location for students, prior to the mid-twentieth century, Sunnyside in Morgantown, WV, was home to a diverse population. As a primarily working class neighborhood, Sunnyside provided affordable housing, social outlets for permanent and transient populations, and proximity to one's workplace, campus, and downtown Morgantown. In the past thirty years, as West Virginia University's student population grew, student housing demands significantly altered Sunnyside's historic building stock. Since 2013, graduate students in West Virginia University's public history program have researched over thirty Sunnyside properties including factories, businesses, houses, and social institutions. We edited and compiled these narratives into a concise, thematic document for public consumption, with historic and current photographs and a map to help the reader better understand the scope of the neighborhood. This study provides a foundation for future research about the area and its residents, preserves many fascinating Sunnyside narratives, which is critical considering current and future real estate development, and serves as an example for other historic communities that struggle to coexist with increasing student populations.

OTHER

28. Is Pittsburgh the Next Regional Silicon Valley of the East?

Carrie Digman (Kanawha County, WV); Nicole Flesche (Jew Jersey)

Institution: West Virginia University
Field: Business
Faculty Advisor: Ajay Kumar Aluri

The primary purpose of this study was to determine if Pittsburgh can become the next regional Silicon Valley of the East. Using Smith Travel Research (STR) data, outside research, and insights from staff at Visit Pittsburgh a market study of Pittsburgh was conducted between August and November of 2017. The market is currently saturated with hotel supply with 29,095 total rooms; thus, the market cannot hold higher demand levels (20,861 total demanded rooms as of July 2017). The greater Pittsburgh hotel market area had a 53% growth after the economic recession in 2008. As the Marcellus Shale industry has declined within the past year, the market is struggling to maintain demand levels like those in 2014 and 2015 where we see a slight increase of $704 million in revenue. However, with a 5% increase in GDP over the past five years, the future for hotel demand in the Pittsburgh market is optimistic as GDP is estimated to be $55,000 by 2018. The current industry sectors that drive travelers into the market include sports, education, and healthcare, but with the increase in supply, the Pittsburgh market cannot sustain in the future. With over 1,600 technology companies located in the Pittsburgh market, there is an opportunity for hotels in the area to secure group business going forward. Based on the findings throughout the research process, this market study determines that Pittsburgh does have the ability to become the next regional Silicon Valley of the East.

29. Project Based Learning Infused in a Teacher Preparatory Program

Kelsi Settle (Ohio)

Institution: Bethany College
Field: Education
Faculty Advisor: Sherri Theaker

Faculty and teacher candidates will provide evidence during a poster presentation that reveal an increase in efficacy and autonomy while employing a project-based learning experience with students exhibiting a variety of abilities. According to the Buck Institute for Education, project-based learning has its roots in experiential education and the philosophy of John Dewey (Buck Institute for Education,2015). The Buck Institute for Education defines project-based learning as a systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks (Buck Institute for Education, 2015). To determine pre-service teacher perceptions about project-based learning after implementing a project-based learning experience, data was collected from a questionnaire. The questionnaire comprised of questions that focused on student knowledge and experiences about project-based learning. Seven open-ended questions were employed to qualitatively measure student responses Participants include current as well as graduates of the undergraduate teacher preparatory program. Keywords: project-based learning, constructivism, pre-service teachers, efficacy, autonomy

30. Was Returning Iwo Jima the Right Choice?

Kristen Brown (Putnam County, WV)

Institution: Marshall University
Field: History
Faculty Advisor: Damien Arthur

Lyndon B. Johnson made the difficult decision to give Iwo Jima back to Japan for the betterment of the country despite the emotional and moral significance keeping it had to many Americans. Many American citizens and veterans were still living that had been alive during the battle of Iwo Jima. The decision to return it elicited a negative emotional response, especially since they were alive to witness it. Despite many Americans disagreeing, returning Iwo Jima was a smart decision for America. It initiated a stronger alliance between America and Japan, giving America more security. Returning Iwo Jima to Japan was beneficial to Japan since they were very weak and an easy target for other countries. The return of multiple territories made them stronger and a better ally to America. Iwo Jima was not providing many benefits for America to hold on to post war. The battle of Iwo Jima had a strong hold on many Americans emotionally and continues to, to this day since the photograph and the statue of the soldiers raising the flag is one of the most iconic parts of the war. The death toll and injury counts are very large considering how small the island is and are very impactful still to this day. Although giving Iwo Jima back to Japan may have caused many American citizens and veterans to feel deeply saddened and even betrayed, it was the right decision to make to maintain peace and security for the United States.

31. The Rebirth of Coal in West Virginia

Courtney Carter (Ohio County, WV)

Institution: West Liberty University
Field: History
Faculty Advisor: Moonjung Kang

The research of this project is about the renewed discovery of one of West Virginia's mineral resources as an art form. For West Virginia, the history of coal started in 1742 when John Peter Salley found an outcropping of coal while traveling across the Allegheny Mountains, by the Kanawha River. In 1810, the people of Wheeling started to use coal as an energy source to warm their homes, and by 1817, coal started to replace charcoal as fuel for many Kanawha River salt furnaces. Today, coal is mostly used for electricity as well as aiding multiple industries like cement, steel, and paper. However, in 1963, a new industry was created in West Virginia. Donald L. Page spearheaded the Arts and Crafts Technical Assistance Demonstration Project that was aided by the U.S. Department of Commerce, and set out to do something for the artisans and craftsmen of West Virginia that was appealing yet also had marketability. Using his surroundings to his advantage, Page found art in coal by using it as a medium and created sculptures out of the mineral. After he found success with the new industry, Page taught others about the coal-craft and soon the business spread across West Virginia and even into neighboring states. What was once thought as a nonrenewable resource, has now been reborn into beautifully crafted work of art that appeals not only to the people of West Virginia, but also across the United States.

32. Healing in Public Space Design: Positive Distractions in Pediatric Healthcare Environments

Krisha Redillas (Kanawha County, WV)

Institution: West Virginia University
Field: Other (Architecture)
Faculty Advisor: Shan Jiang

This systematic literature review examines the effect of positive distractions on hospital occupants in pediatric healthcare facilities. "Positive distractions" are built environmental features that are utilized to reduce stress by diverting attention, and have become important tools in designing healthcare environments (Ulrich, 1991). In this review, twenty-five studies were collected for analysis from architectural and medicine databases. Findings highlighted the importance of incorporating positive design elements, such as interactive play devices, multi-sensory installations, and replications of the natural environment (Adams, 2010). The analysis conducted suggests that incorporating positive distractions enhances occupant psychological experience and health outcomes: (1) emotional well-being, (2) perceived quality of care, (3) anxiety and stress levels, and (4) overall restlessness in patient's composure. Furthermore, six case studies were found, which were representative of innovative healthcare gardens. Results advise that future studies assess relationships between positive distractions and clinical public green spaces. The correlations observed in this review expands knowledge in current design issues in environmental psychology, and its results contribute to healthcare architectural practices.

33. Disability Kids Targeted by Bullies

Linda Hall (Marshall County, WV)

Institution: West Liberty University
Field: Other (Community Education Disabilities Services)
Faculty Advisor: Miriam Douglas

The purpose of my research is to examine bullying and why rates are higher among the disabled and special needs community. The three years that I have worked at Miracle Field, (handicap baseball field), I have observed how continued bullying and the distrust of outsiders has affected the spirit of many of my players. They are often withdrawn and introverted to the point of not wanting to participate. In comparison to young athletes that I teach softball and pitching to, the special needs and persons with disabilities are noticeably more distrusting and withdrawn.   Labeling of the disabled community is at the forefront of why people with special needs are targeted by bullies. The methods that we have incorporated at Miracle league are those of acceptance and positivity to create a proactive approach towards obtaining mutual respect and trust. Every participant is assigned a "buddy". The individual buddy system is in place to give one-on-one attention to every player. We have had great results with this procedure. Our long-term players are happy, relaxed and able to genuinely enjoy their games at Miracle League. The handicapped community has enough obstacles to overcome in life. Through positive reinforcement and utilizing confidence building skills, Miracle League offers a community based support system. Miracle League offers a family friendly atmosphere to incorporate parents and siblings into the player's experience. The community, family and friends' involvement provides a holistic approach to building trust and allows the healing process to begin.

SCIENCES

34. Exposure and Behavioral Assays of OMRI Approved Insecticides on Green Lacewing, *Chrysoperla rufilabris*

Harley Pauley (Kanawha County, WV)

Institution: West Virginia State University
Field: Agriculture
Faculty Advisor: Barbara Liedl

Using biological control agents in protected culture is a critical part of IPM, especially for the control of the two major pests: whiteflies and aphids. Limited research is available on the effect of OMRI approved insecticides on biological control agents. We evaluated the selectivity of four OMRI approved insecticides against 2nd instar larvae of the generalist beneficial control agent, *Chrysoperla rufilabris*, in triple exposure and behavioral assays. Triple exposure assays were conducted with thirty 2nd instar larvae per treatment with positive and negative controls and four insecticides applied at the highest rate on the label. Insects were monitored daily for mortality and developmental time points. All insects treated with the positive control, DEET, died within an hour. Less than half of the Azatin-O® treated larvae pupated and the four-day delay was statistically different from the control and three other insecticides, EcoTec®, M-Pede® and PyGanic®. Less than 25% of Azatin-O® treated larvae produced adults compared to over 90% for the other treatments. Behavioral assays were conducted with the same treatments versus a control using ten 2nd instar per larvae treatment with the ViewPoint tracking system. Trials with DEET, EcoTec®, M-Pede® and PyGanic® were statistically significant for ambulatory time, % of time spent in each half of the arena and distance travelled but not with Azatin-O®. Care must be taken when applying insecticides in combination with beneficial insects. Our work found one impeded insect development (Azatin-O®), but others reduced foraging ability of the larvae on sprayed surfaces (EcoTec®, M-Pede® and PyGanic®).

35. The Great American Solar Eclipse 2017

Jacob Staggs (Mingo County, WV); Derek Staley (Cabell County, WV)

Institution: Marshall University
Field: Astronomy
Faculty Advisor: Jon Saken & Paulus Wahjudi

For for the first time in almost 40 years the solar eclipse totality path crossed the entire United States. Our goal was to provide live streaming video and images from a high altitude balloon along part of the eclipse path. We flew three main payloads that were responsible for tracking, images, and video. The video payload transmitted a live stream from 70,000+ feet. The still image payload took images throughout the entire flight. Around 95,000 feet the balloon burst and the parachute deployed for landing. During this time, we also had the ground station tracking the payloads location and retrieving the video and images from the payloads. An iridium payload was used for precise tracking, it communicated with the base station to give exact GPS coordinates and elevation. We successfully retrieved video of the eclipse from 70,000-80,000 feet, flew the balloon along the required path of totality, and retrieved all payloads. We have now started a ballooning program at Marshall University for future research and student projects/capstones.

36. Observations of Possible Supermassive Black Hole Binary in Distant Galaxy

Rodney Elliott (Marion County, WV)

Institution: West Virginia University
Field: Astronomy
Faculty Advisor: Sarah Burke-Spolaor

Galaxy J1018+3613 is approximately 700 million light years away and was first identified as a possible single-cored merger remnant by the Galaxy Zoo citizen science project. These galactic merger events are important sources of gravitational waves that the pulsar timing array method will be able to detect in the near future. We subsequently made follow-up observations of the core of this galaxy using the Very Long Baseline Array radio telescope. In all we collected 22 hours of observational data in three separate radio bands: 2, 5, and 8 GHz. Images generated from our data show two distinct radio sources in the core of galaxy J1018+3613, separated by about 20 parsecs (65 light years) of space. Preliminary analysis yields three possible explanations for this structure. It could be a binary supermassive black hole (SMBH) in active orbit. If so, we could place interesting limits on the continuous gravitational waves from this object. It could also be a recently coalesced SMBH. If this is the case, then the two distinct objects in our images are likely the two lobes of a recently turned-on radio jet. Finally, it is possible that the second black hole in this merger either never existed, is smaller than expected from the merger model, or is simply not yet centralized and is not radio-luminous. Any one of these possibilities represents an interesting discovery. Further multi-wavelength follow-up of this target will help reveal its nature.

37. The Pulsar Research Collaboratory: Bringing the Wonders of Universe into West Virginia Schools

Olivia Young (Mineral County, WV); Gabriella Agazie (Monongalia County, WV)
Institution: West Virginia University
Field: Astronomy
Faculty Advisor: Maura McLaughlin

The Pulsar Research Collaboratory (PSC) is dedicated to educating high school students across the state about the wonders of radio astronomy. Students learn the basics of the field and have the opportunity to do scientific research analyzing data taken from observations on the Green Bank Telescope (GBT). Closely related to the PSC is the Science Public Outreach Team, also known as SPOT, which partners with NASA to take science presentations and demonstrations into elementary, middle, and high schools. Presentation topics range from the water systems in West Virginia to deep space radio wave emissions. Through SPOT, the PSC recruits college students mentors who share their knowledge and experience with the high schoolers. Undergraduate physics students at West Virginia University are able to expand their research into pulsars through the PSC. Students use the GBT to research pulsar candidates found by the PSC which can result in new and exciting discoveries in the field of astrophysics. We will discuss the process of finding pulsars, the discoveries being made, and how students of all ages across the state are being positively impacted through the program.

38. Pharmaceutically and agriculturally important ergot alkaloids from fungi of the genus *Metarhizium*

Jessi Tyo (Braxton County, WV); Caroline Leadmon (Putnam County, WV)

Institution: West Virginia University
Field: Biochemistry
Faculty Advisor: Daniel Panaccione

Fungi in the genus *Metarhizium* are known natural insecticides and are found in roots of many plants. *Metarhizium* species were found to have the genetic capacity to produce lysergic acid-derived ergot alkaloids, which are medically and agriculturally important chemicals. In order to characterize ergot alkaloid production, *Metarhizium* species were cultured on roots of plants, inside insects, and on different types of media. No alkaloids accumulated in infected roots of several plants, moderate quantities were produced in culture media, and 300 times more ergot alkaloids were produced in inoculated larvae of the insect *Galleria mellonella* than in culture media. Several *Metarhizium* species produced derivatives of lysergic acid that are pharmaceutically relevant but rarely found in fungi. *Metarhizium* species also are unique in the fact that they secreted ergot alkaloids into culture media rather than retaining them, possibly facilitating future production of pharmaceuticals. In functional analyses, we investigated an unknown gene, *easO*, in the ergot alkaloid pathway of *Metarhizium anisopliae* to learn its biochemical function and to test the role of ergot alkaloids in insect pathogenesis. Knocking out *easO* revealed its role in steps between the pharmaceutically important ergot alkaloid ergonovine and the *M. anisopliae* pathway end product lysergic acid α-hydroxyethylamide (LAH). Ergonovine-accumulating easO knockout strains killed larvae faster than the LAH-accumulating wild type; however, the *easO* knockout fungus rarely emerged from dead larvae, whereas the wild-type fungus sporulated profusely on larval cadavers. These data indicate that ergot alkaloids play a major role in the interaction of *Metarhizium anisopliae* with insects.

39. Investigating the Role of Increased Temperature On the ECM Related Proteins of Aiptasia pallida

Ally Brown (Boone County, WV)

Institution: Glenville State College
Field: Biology
Faculty Advisor: Sara Sawyer

Reef-forming corals form a mutualistic symbiosis with dinoflagellate algae and it is this symbiosis that provides the corals with the nutrients needed to form massive reefs. Corals are subjected to an increasing array of environmental stresses and under stress corals can lose their symbiotic algae, or bleach. Increased water temperature is the leading cause of coral bleaching and this temperature change induces oxidative stress and likely leads to programed cell death (apoptosis). Previous research has suggested that temperature affects the expression of genes for extracellular matrix proteins, for example collagen and the matrix metalloproteinases (which remodel the extracellular matrix) in the symbiotic tropical sea anemone *Aiptasia pallida*. Alterations in expression of this group of genes could affect cell survival and/or cell death pathways. In this study, we are investigating how temperature affects the expression of multiple genes involved in regulating the extracellular matrix in the sea anemone *A. pallida*. To date we have identified two different control genes, RPL11 and GPD1 that work well in our system. We are currently testing primers against MMP-9, MMP-14, MMP-17, Zn-MP 4, Zn-MP 6, and Zn-MP 7 genes to determine how well they will work in qPCR. These matrix metalloproteinase genes are of interest because we are trying to determine the underlying mechanisms and reasoning behind the remodeling of the extracellular matrix during temperature-induced bleaching.

40. Towards a Revision of Diastema Within Central America

Scott Wentz (Randolph County, WV)

Institution: Glenville State College
Field: Biology
Faculty Advisor: Jeremy Keene

Diastema is a genus of plants within the subtribe *Gloxiniinae* (Gesneriaceae). Some of the key characteristics of Diastema are a racemose flowering axis consisting of solitary flowers in the axils of bracts on the stems with condensed internodes, nectary consisting of 5 finger-like glands, and a distinctive bi-lobed stigma. I am currently collecting morphological and molecular data and will complete field studies of the genus *Diastema*. Morphological studies will focus on taxonomically useful vegetative and reproductive characters with special emphasis given to trichome structure and fruit shape. Field studies will provide an opportunity to obtain data that is not easily observed on herbarium specimens. The outcomes of this research will provide a baseline for conservation and governmental agencies to work from to protect the habitat where these species exist. Evolutionary studies will be completed following the field study to ascertain the relationships between the species present. My research will be used toward a more comprehensive study of the subtribe and genus.

41. Influence of industrialization on microbial communities in WV waterways

Shelby McKeand (Wayne County, WV)

Institution: Marshall University
Field: Biology
Faculty Advisor: Jennifer Mosher

West Virginia rivers face many challenges, whether flowing through industrialized cities or though rural areas laden with mining operations. To address these differences among land use we chose the Kanawha and Mud Rivers, both tributaries to the Ohio River, which have historically been impacted with organic pollutants and heavy metals. The goal of this study was to analyze sedimentary microbial communities along the stretches of each river, before and after traveling through industrialized/mining areas and comparing these compositions with land use and geochemical parameters of the water and sediments. We sampled ten sites from each river in duplicate. The bacterial communities were analyzed by high-throughput sequencing platform (Illumina Mi-Seq). Preliminary data suggest that sites upstream of both heavily industrialized and mining areas had greater bacterial diversity and were dominated by *Betaproteobacteria*, *Alphaproteobacteria* and *Sphingobacteria*. The most abundant bacterial classes in the downstream samples include *Deltaproteobacteria* and *Betaproteobacteria* and lower taxonomic diversity. These results appear to be correlated with the historical metal content of the sediments. Further studies are warranted to determine the extent of which metal concentrations will impact microbial communities in the two rivers.

42. The TALLYHO Mouse as a Model of Obesity-Induced Linear Growth Acceleration

Chad Meadows (Ohio)

Institution: Marshall University
Field: Biology
Faculty Advisor: Maria Serrat

Nearly one third of American children are obese and may develop musculoskeletal complications because of excess stress on their growing skeleton. Obese children have higher rates of growth than non-obese peers, but it is unclear why this occurs. The TALLYHO/Jng (TH) obese mouse exhibits many traits consistent with human type 2 diabetes, but little is known about its skeletal anatomy. We tested the HYPOTHESIS that TH mice have increased bone lengths when compared to controls on high-fat and standard chow diets. We measured body mass and bone lengths in TH obese and C57BL/6 (B6) non-obese mice on standard chow during 3-5 weeks after birth (N=5 per group). To study diet impact, we examined adult bone lengths in 20-week-old TH and B6 mice that were fed high-fat (58% kcal fat) or standard chow (13% kcal fat) diets beginning at 4-weeks age (N=8-10 per group). Bone lengths were increased 3% in TH mice on normal chow at the 5-week endpoint. After 16 weeks on a high-fat diet, TH mice were twice as large as standard chow controls, while B6 mice on a high-fat diet were over 20% larger than their respective controls. Bone length was ~2% longer in the high-fat diet groups than the chow controls within each genotype. These data demonstrate that the TH mouse is a good model of obesity-induced linear growth acceleration. Future studies utilizing the TH mouse will be important for determining underlying mechanisms and for preventing devastating skeletal consequences of obesity.

43. *Podostemum ceratophyllum* and its Occurrences in Eastern North America

Edward Beaumont (Hancock County, WV)

Institution: West Liberty University
Field: Biology
Faculty Advisor: James Wood

Podostemum ceratophyllum, commonly referred to as horn-leaved riverweed, is a species of aquatic plant that inhabits fast-flowing bodies of water throughout eastern North America. *Podostemum ceratophyllum* increases benthic complexity and is often utilized as a food source for many vertebrates and invertebrates. The plant also influences nutrient cycling by absorbing nitrogen and phosphorus from the water column and contributes to the detrital carbon pool. However, previous anecdotal evidence indicates that the overall occurrence of *P. ceratophyllum* is gradually declining, but the lack of research on population stability precludes definitive conclusions. Our research has focused on combining published accounts of *P. ceratophyllum* occurrences with herbarium records and internal documentation provided by state agencies. Through the development of a comprehensive database, better conservation efforts can be implemented for *Podostemum ceratophyllum* and researchers will gain a better understanding of population stability for this important species. Ultimately, this effort provides valuable information to river managers and those working to restore rivers where *P. ceratophyllum* has been extirpated due to pollution or other environmental stressors.

44. Efficacy of Resazomycins Against *Burkholderia cepacia*

Isaiah Selmon-Miller (Ohio County, WV)

Institution: West Liberty University
Field: Biology
Faculty Advisor: Deanna Schmitt

The CDC estimates that there are approximately 2 million new cases of antibiotic-resistant infections annually resulting in 23,000 deaths and billions of dollars in health care costs. The development of new drugs is imperative to combat this crisis and prevent the loss of additional lives from once "curable" diseases. We recently identified a novel family of resazurin-based compounds, resazomycins, which exhibit antimicrobial activity against *F. tularensis* and *N. gonorrhoeae* in vitro and in vivo. A common feature of both these bacterial species is possession of a unique lipoprotein sorting system, LolDF. To investigate the relationship between LolDF and susceptibility to resazomycins, we propose performing antibiotic susceptibility testing on a diverse collection of medically important LolDF-possessing bacterial strains. My project focuses on characterizing the efficacy of two resazomycins, resazurin (Rz) and resorufin pentyl ether (RPE), against *Burkholderia cepacia*. *B. cepacia* poses little medical risk to healthy people; however, people who have weakened immune systems or chronic lung diseases, particularly cystic fibrosis, may be more susceptible to infections with *B. cepacia*. *B. cepacia* is also related to the highly pathogenic bacteria, *Burkholderia pseudomallei* and *Burkholderia mallei*, the causative agents of melioidosis and glanders, respectively. We are currently working to determine the minimal inhibitory concentration (MIC) of Rz and RPE against *B. cepacia* and if these antibiotics are effective at killing this bacterium within eukaryotic cells. Future investigations may involve using *Galleria mellonella* larvae as an infection model for *B. cepacia* to evaluate the in vivo efficacy of Rz and RPE.

45. Effects of Boletus Edulis Mushroom Extracts on Brain Tumor Cell Proliferation

Oddai Gharib (Putnam County, WV)

Institution: West Virginia State University
Field: Biology
Faculty Advisor: Gerald Hankins

Glioblastomas are tumors that arise from astrocytes which are supportive cells of the brain. The cells of these tumors rapidly invade normal brain making these tumors highly malignant. Treatment is difficult and glioblastomas are usually fatal. Meningiomas arise from the meninges that surround the central nervous system. Although most meningiomas are benign they can still be dangerous. Further, there is no effective chemotherapy for meningiomas. Researchers are interested on how natural products, including extracts of particular species of mushrooms, can affect the number of viable tumor cells. The research objective was to evaluate the effects of *Boletus edulis* mushroom, a native West Virginia species, on the proliferation/survival of glioblastoma and meningioma cells, focusing on the number of viable cells. The mushroom extract was obtained by extracting ground mushroom with methanol and water. The extract was separated from insoluble solids by filtration. Then, the solvents were removed by rotary evaporation the dissolved at different concentrations in cell culture media to treat the cancer cells. Results with CH-157-MN meningioma cells were variable and inconclusive. Interestingly, after treating the A-172 glioblastoma cells with both low and high concentrations of *Boletus edulis* mushroom extract; the number of cells increased with increasing concentration of treatment. This indicates that the extract may contain specific compounds responsible for increasing the cell proliferation or inhibiting apoptosis (programmed cell death). If further experiments support these observations, the extracts or compounds from them may be of potential use in preventing apoptosis in conditions such as stroke or traumatic brain injury.

46. In Vitro Effects of Coal and Progesterone on Glioblastoma Proliferation and Progestogen Receptor Expression

Victoria Ramey (Kanawha County, WV); Edgar Lopez (Kanawha County, WV)

Institution: West Virginia State University
Field: Biology
Faculty Advisor: Gerald Hankins

Glioma incidence in males is 1.5-2 times that of females, thus it's suspected that female sex hormones play a protective role against gliomas. Compounds found in water contaminated by extractive industry waste can disrupt hormone mediated signaling. Studies have been done on endocrine disrupting effects on estrogen signaling, but little has been done on their effects on progesterone signaling. Additionally, the focus has been on classical receptors, with almost no investigation of G-protein coupled receptors. Here we investigate the effects of exposure to coal dust on cell proliferation and expression of progestin and adipoQ receptors (PAQRs) in two human glioma cell lines, A-172 and U-87. Treatments with coal dust and treatments with progesterone were performed. End point RT-PCR was performed to demonstrate receptor expression. A-172 cells express PAQR3, PAQR5, and PAQR9. This was the first demonstration of PAQR5 expression in A-172 cells. U-87 cells express PAQR3, PAQR5, PAQR7, PAQR8, and PAQR9. Real time RT-PCR was performed to determine relative receptor expression per treatment type. U87 cells treated with coal dust showed up-regulation of PAQR8 and PAQR9. A-172 cells from both treatment sets showed up-regulation of PAQR9. Proliferation test on A-172 showed 20% increase in proliferation in cells treated with coal dust for 24 hours and a 6% increase in cells treated for 48 hours. The U87 cell line showed a 7% increase in proliferation after 24 hours of coal dust treatment, with no statistically significant change for 48-hour treatments. Neither cell line expressed statistically significant changes after progesterone treatment.

47. Acid Rain Reduces Root Carbon Exudation to Beneficial Fungi: Implications for Climate Change

Rachel McCoy (Raleigh County, WV)

Institution: West Virginia University
Field: Biology
Faculty Advisor: Edward Brzostek

Historically, forests in West Virginia have received some of the highest inputs of nitrogen and sulfur from acid rain. The Clean Air Act has greatly reduced these inputs, but there remain legacy effects on forest health. These effects are important because forests in WV are critical sinks of carbon dioxide and help maintain water quality in the region. Generally, trees produce more wood when they are fertilized by the nitrogen in acid rain. However, there are also important responses that happen in the soil beneath our feet. Trees in WV forests exude sugars through their roots to 'feed' beneficial fungi called mycorrhizae that help them obtain nutrients. Arbuscular mycorrhizae use this carbon to increase surface area of roots in soil and ectomycorrhizae use even more tree carbon as energy to speed up soil decomposition which releases nitrogen for trees. We hypothesized that when trees receive additional nitrogen through acid rain they would invest less carbon in mycorrhizae to access nutrients. We measured root carbon exudation at a long term-experiment at the Fernow Experimental Forest in Tucker County, WV in a watershed that receives additional acid rain inputs by helicopter and one that is a control. We found that acid rain reduced root exudation to ectomycorrhizal fungi to a greater extent than AM fungi. These reductions may increase soil carbon storage because ectomycorrhizal fungi need root exudates to speed soil decomposition. As such, these results have important implications for the ability of WV forests to slow the rate of climate change.

48. Toxicity of Inhaled Welding Fumes on Exposed Worker Respiratory and Reproductive Cell Lines

Karagan Mulhall (Monongalia County, WV)

Institution: West Virginia University
Field: Biology
Faculty Advisor: Stephen Leonard

According to the U.S Department of Labor Women's Bureau, the number of female welders in the United States is approximately 26,000 and has increased by more than 2% over the past decade. Our study uses mouse monocyte macrophages (RAW 264.7) and human placental cells (HTR-8) to investigate the possible toxicity of stainless steel (SS) and mild steel (MS) welding fumes on respiratory and reproductive systems. Welding fumes were collected and sized to determine their chemical characteristics and ability to penetrate biological systems. The possible toxic effects of both types of fume were measured using cell viability, generation of reactive oxygen species (ROS), cell membrane damage, DNA damage, and cytokine release. Fumes were found to contain different chemical make-up and a mean size of 166.2 nm. ROS showed an increase after exposure with SS fumes being significantly higher. Both DNA damage and cytokine production showed increases after exposure. While both SS and MS fumes proved significantly toxic to the cells, SS showed increase in toxicity when compared to MS in both RAW 264.7 and HTR-8.

49. Microsatellite Marker Development for *Polypodium appalachianum* (Appalachian Rockcap Fern)

Vishnupriya Kasireddy (Kanawha County, WV); Annabella Pauley (Wayne County, WV)

Institution: Marshall University
Field: Biology
Faculty Advisor: Emily Gillespie

Microsatellite markers were developed for a fern species native to eastern North America, *Polypodium appalachianum* (Appalachian Rockcap Fern), to facilitate investigation of the genetic diversity and phylogeography of this taxon and its closest relative and possible hybrid offspring, *Polypodium virginianum* (Common Rockcap Fern). Forty-eight primer pairs were designed from Illumina data and screened for their ability to amplify a single, clear band in seven *P. appalachianum* individuals. A subset of 16 promising markers were genotyped for a single population of 24 individuals from Alleghany County, North Carolina, USA in order to confirm the ploidy of *P. appalachianum* and to evaluate intra-population variability. All 16 markers were used to amplify two additional populations from the northern part of the range of *P. appalachianum* in order to show inter-population variability. Cross-species amplifications were conducted on *P. virginianum*, as well as several other closely related *Polypodium spp*. in order to demonstrate whether the markers developed for *P. appalachianum* are likely to be useful in closely related species.

50. Small Scale Optimization of Amplification and Sequencing of the Internal Transcribed Spacer of
   Rubus

Edwina Barnett (Ohio); Doug Bright (Kanawha, WV)

Institution: West Virginia State University
Field: Biology
Faculty Advisor: Doug Bright

Rubus is the taxonomic name for a genus of fruiting plants including the blackberry, raspberry, and thimbleberry. This genus is ecologically important in early forest succession and economically important as fruiting crops and ornamentals. The taxonomy of the genus is complex, therefore a solid understanding of the evolutionary relationship within the genus is needed for breeders to take advantage of these traits. To achieve this molecular based study of *Rubus*, DNA was extracted from 47 fresh *Rubus* tissue samples, the internal transcribed spacer for RNA-coding nuclear genes (ITS) was amplified, and gel electrophoresis was run on the samples. A band present at 376 – 378 bp was indication of successful ITS1 amplification and a band at 409 – 411 bp was indication of successful ITS2 amplification. The samples where then prepared for sequencing and the sequenced samples were edited, assembled, and aligned. Phylogenetic trees of the markers were generated using Bayesian inference, along with concatenated trees. The overall sequencing success rate of ITS1 was 72.3 % and the sequencing success rate of ITS2 was also 72.3 %.

51. Genome Wide Association studies on nutraceutical effects of *Nigella sativa* on *Drosophila*
   melanogaster

Samantha Belcher (Kanawha County, WV)

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

Nigella sativa (Family Ranunculaceae) (black-caraway or black cumin) is native to Southern Europe, North Africa and Southwest Asia. It has a variety of uses in cuisine and medical field. Its pharmacological action includes anti-diabetic, anticancer, immunomodulator, analgesic, antimicrobial, anti-inflammatory, spasmolytic, bronchodilator, hepato-protective, renal protective, gastro-protective, antioxidant properties, etc. The seeds of *N. sativa* have also been widely used in the treatment of different diseases and ailments. Some of its important active compounds are thymoquinone, thymohydroquinone, dithymoquinone, p-cymene, carvacrol, 4-terpineol, t-anethol, sesquiterpene longifolene and thymol etc. We focused mainly on its anti-obesity, anti-diabetic, and antioxidant properties. We intend to study these benefits on *Drosophila melanogaster*. Black cumin seeds were fed to the flies. Changes in dry body weight, glucose level and lifespan were measured after two weeks of feeding. We used 40 Drosophila melanogaster Genetic Reference Panel (DGRP) lines to perform a genome-wide association analysis for food intake, body weight and lifespan and negative geotaxis using ~2M common single nucleotide polymorphisms (SNPs). Preliminary data shows some fly genotypes respond positively to the black cumin treatment. There is a reduction in the body weight and a decrease in the glucose level in the *Drosophila* body. Details will be presented.

52. In Vitro Effects of Arsenic on Steroid Receptor Expression in Glioblastoma Cells

Dylan Jayasuriya (Kanawha County, WV); Leslie Garcia (California)

Institution: West Virginia State University
Field: Biology
Faculty Advisor: Gerald Hankins

Arsenic is a contaminant in areas where coal is mined, processed or burned including the Kanawha River basin. Arsenic is an endocrine disruptor as it interferes with receptor functions, including progesterone receptors, and has been associated with increased risk of cancer. Progesterone receptors (PR) are known to regulate expression of genes that regulate cellular processes such as proliferation, migration, and apoptosis. Progesterone and progesterone receptors have important roles in normal development as well as brain cancer. We investigated effects of progesterone and arsenite on genes relevant to progestin signaling in human glioblastoma cell line A-172. We evaluated PAQR3, PAQR5 and PAQR9, which are seven-transmembrane progestin receptors. Effects of endocrine disruptors on these receptors have not been well studied in. FOS and ESR1 expression respond to progesterone signaling. Quantitative RT-PCR analysis showed changes in expressions of these genes in glioblastoma A-172 cells treated with sodium arsenite ($NaAsO_2$) compared to control. Arsenic increased expressions of FOS and PAQR3 in these experiments. It would be interesting to focus experiments on these genes to further uncover their potential roles in the mediation of arsenic effect, positive or negative, in brain cancer. For now, we concluded that varying concentrations of arsenic in glioblastoma cells cause changes in expression of progestin receptor PAQR3 and transcription factor FOS genes. In future, we plan to conduct more experiments with water samples collected directly from streams that might have arsenic contamination and test how they affect these genes.

53. Genome-Wide Analysis of the CER Gene Family Using Wax2 Motif in Plants

Benjamin Thompson (Putnam County, WV)

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

Cuticular wax, found primarily in the cuticle of vascular plants, consists of amorphous intracuticular wax embedded in cutin polymer. Cuticular wax is mainly composed of long-chain aliphatic compounds derived from very long chain fatty acids. Here, we focus on analysis of the ECERIFERUM (CER) gene family that regulates synthesis of plant cuticular wax. Analysis of this family was focused upon CER members containing the Wax2 motif. We used the Phytozome database to find 260 CER genes from different species using Arabidopsis CER genes as reference. The genome-wide analysis of the CER family genes, including chromosome localization, gene structure, phylogenic relationships and conserved domain analysis was carried out. To explore the evolutionary relationship of CER family members, a neighbor-joining (NJ) tree was constructed using MEGA software, with full length CER proteins from the different plants and Arabidopsis. A Phylogenetic tree grouped all the 260 candidate genes in 10 clades to represent the evolution among the species. The gene structure revealed that the maximum number of exons was fifteen and the minimum was one. To find out the structural diversity and functional prediction of CER proteins, total of 6 conserved motifs per cluster were captured by MEME server. Wax2 motif was the common motif found in all clusters. Thus, genome-wide analysis of CER family will be helpful to understand the possible roles of CER genes across different species. Also, this comparative analysis may be useful for future research of cutin synthesis in other plant species such as *Capsicum annuum* and Glycine max.

54. **Duck Potato Extract May Lead to the Inhibition of Biofilm Formation of *Pseudomonas aeruginosa***

Adam Bert (Brooke County, WV)

Institution: West Liberty University
Field: Biology
Faculty Advisor: Joseph Horzempa

Pseudomonas aeruginosa is a gram-negative bacterium that forms biofilm on many surfaces as well as within the lungs of cystic fibrosis (CF) patients. *Pseudomonas* biofilms are particularly dangerous because these structures protect bacteria from antibiotics and other chemical antimicrobial agents. Therefore, compounds that inhibit biofilm formation of *P. aeruginosa* are highly desired. In a separate study by our laboratory, we observed that Duck Potato extract (*Sagittaria latifolia*) exhibited antimicrobial activity on *Clostridium perfringens*, a pathogenic Gram-positive bacterium. Therefore, duck potato extract was evaluated to determine whether or not it was capable of inhibiting the growth of other pathogenic bacteria. Duck Potato plants were collected, the leaves were removed, and ethanol was used to extract organic compounds. The extracted material was added to a culture of *P. aeruginosa*. While duck potato extract did not inhibit the growth of this bacterium, a cursory analysis indicated that biofilm production was mitigated. We therefore conducted several microtiter-based biofilm studies to determine whether duck potato extract was capable of inhibiting the formation of *Pseudomonas* biofilms. Results showed that the Duck Potato extract did not directly kill the bacteria, however, this extract appeared to inhibit the biofilm formation of *P. aeruginosa*.

55. Developing a pH Sensor Using Different Forms of Polyaniline

Megan Nally (Hancock County, WV)

Institution: Bethany College
Field: Chemistry
Faculty Advisor: Scott Brothers

Conducting polymers are organic polymers used in different applications as a result of their ability to conduct electricity. Conducting polymers have been popular since the 1970s in applications such as biosensors, actuators, and pH sensors. More recently, conducting polymers have been used in LED lighting and solar cells. A pH sensor can be useful to detect aqueous carbon dioxide systems and the pH in wine. Polyaniline is a conducting polymer that has six carbon rings containing conjugation that are bridged by nitrogen atoms. The forms of this polymer can be protonated or deprotonated, making them acid and base sensitive. The pH sensor can be engineered by placing a form of polyaniline onto the surface of a conducting glass slide or copper metal, and is then connected to a multimeter to determine the conductivity. If the environment is more acidic, then the resistance should decrease, and vice versa with a basic solution. The resistance will be measured in solutions with a variety of pH values to determine the rate and amount of resistance change. After each trial, the sample of the conducting polymer will be removed and dissolved in a solvent to be measured using the ultraviolet-visible spectrometer (UV-Vis). After the experimental design has been optimized, the sensors could be used to measure the acidity of a variety of carbonated beverages.

56. Synthetic Studies of Biologically Active Natural Product

James Corvin (Mercer County, WV)

Institution: Bluefield State University
Field: Chemistry
Faculty Advisor: Young Kim

CDC Agency reports over half a million US citizens die from cancer annually, and estimates these medical costs to be nearly $90 billion for cancer in the United States. Knowing this, research related to synthesizing natural products has risen in popularity among many medicinal chemists and oncologists spanning the world.   These naturally occurring chemicals provide us with many lead molecules that are used as templates for the development of new anti-cancer drug candidates in cancer research. The main objective of our research project is to synthesize the bioactive natural product Penazetidine A that was isolated from *Penares sollasi* in the Indo-Pacific oceans. It shows promising cytotoxicity against A-549 and HT-29 tumor cells with its unique chemical structure. The research conducted by our team is based on an eight-step synthesizing process of Penazetidine A from commercially available protected amino acid and diazoketoester which will be a common intermediate to give rise to azetidinone into Penazetidine A. Current progress, our research group has explored formation of diazoketoester from coupling reactions, followed by treatment of tosyl azide. In our poster, we will be discussing our synthetic approach and NMR data to support chemical intermediates. With the completion of these initial studies, our research lab will focus on metal mediated catalyze reaction to form azetidinone and continue on to natural product synthesis and its SAR study.

57. SHArK Bites: Finding Photoelectrocatalysts for Solar Energy Storage

Jessica Johnson (Lincoln County, WV); Kelcie Clay (Lincoln County, WV); Cody Kropp (Harrison County, WV)

Institution: Fairmont State University
Field: Chemistry
Faculty Advisor: Erica Harvey

The most abundant source of energy on the earth is sunlight, but at the moment, no one knows how to harness enough of it so it can be used to completely replace fossil fuels. The goal of our research is to find a way to help sunlight separate water into hydrogen and oxygen gases, so hydrogen can be used as a source of energy even when the sun is not shining. Though the water-splitting process occurs naturally, it is very slow. The Solar Army, a nationwide group of researchers, is searching for a safe, inexpensive photoelectrocatalyst, a substance that can speed up the sunlight-driven water splitting reaction. Through an NSF-funded research internship at Fairmont State University, rural, first generation students in the First 2 Network joined the WV Brigade of the Solar Army the summer before starting college. Instruments known as SHArK (Solar Hydrogen Activity Research Kit) and SEAL (Solar Energy Activity Lab) were used to test samples containing different ratios and combinations of earth-abundant metal oxides. SHArK and SEAL both test in different ways for photocurrent, an electric current activated by light. Metal oxide samples that produce substantial photocurrent could potentially be developed as photoelectrocatalysts and help the future of the planet. Our research efforts identified several metal oxide combinations, dubbed "SHArK bites," that have potential and could undergo further testing.

58. Spectroscopic Study of a C4H5 Radical: 2-butyn-1-yl

Martha Ellis (Logan County, WV); Glenna Brown (Wetzel County, WV)

Institution: Marshall University
Field: Chemistry
Faculty Advisor: Laura McCunn

There is much to be learned about the formation of hydrocarbons in outer space. Hydrocarbon radicals (reactive species containing carbon, hydrogen, and an unpaired electron) are thought to play an important role as intermediates in the formation of larger hydrocarbons. A radical that has been predicted to participate in these interstellar reactions is the 2-butyn-1-yl radical (C_4H_5). The goal of this project was to isolate and spectroscopically characterize this radical through matrix isolation and FTIR spectroscopy. To do this, 1-bromo-2-butyne was heated in the gas phase at 800 K to generate the radical plus a bromine atom. The products were deposited in a low temperature argon matrix. Vibrational spectra were obtained using FTIR, and the results were compared to vibrational frequencies predicted by Gaussian 09 computational chemistry software. Being able to isolate and analyze this radical in a laboratory environment will serve as a useful benchmark for research concerning radical detection in the interstellar medium and planetary atmospheres.

59. Peri-Coupling of Organometallic Reagents for the Synthesis of Perylenes and Oligorylenes

Ian Perry (Cabell County, WV); Josh Rawson (Kanawha County, WV)

Institution: Marshall University
Field: Chemistry
Faculty Advisor: John Markiewicz

Solar energy is an integral renewable energy source. All of the satellites orbiting Earth are operating off of solar power, so manufacturing more efficient solar cells is imperative for continued space exploration. A class of chemicals, oligorylenes, with their high quantum yields and resistance to photobleaching would be ideal for constructing improved solar cell, but the functionalized derivatives are difficult to synthesize with the current methodology. Thus, the purpose of this project is to develop a general method to produce oligorylenes using more mild conditions. This synthetic method was specifically developed to prepare perylene from 1,8-dihalonaphthalenes. After optimizing conditions, organometallic reagents prepared from 1,8-dibromonaphthalene can be homocoupled in up to 54% yield from a Grignard reagent and a stoichiometric oxidant. The next step is to synthesize naphthalene derivatives to determine the scope to which the developed coupling reaction is tolerant to functional groups. Lastly, the scope is to be explored with the goal of developing materials capable of being used in solar cells and producing novel fluorescent sensors for transition metal ions.

60. Regioselective esterification of glucose for integrated pest management in greenhouse production of tomatoes

Josh Ricket (Ohio); Briana Haas (Kanawha County, WV)

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

Even with the use of integrated pest management (IPM), control of insects in agriculture relies heavily on pesticides, a practice that is increasingly limited by evolution of pesticide-resistant insects and increased health and environmental concerns. Breeding acyl-sugar mediated resistance into tomato varieties for the protected culture system offers the potential to control whiteflies and aphids, two of the top insect pests. However, no research has assessed these compounds effect on biological control agents used. The non-toxicity and broad spectrum of the resistance are major advantages for use in production. Acyl-sugars could prove to be an environmentally friendlier alternative to harsh pesticides, so optimizing their natural production would be ideal. Our first step has been to synthesize specific acyl-sugars in order to ultimately be able to test their effects on beneficial insects and biol. controls in the greenhouse. The target compound was investigated from a retrosynthetic perspective, which allowed for the development of a synthetic route. In retrosynthesis, a synthetic route is created from starting at the end and working towards the beginning. The target compound had positions 2, 3, and 4 esterified. In order to selectively add these acyl groups, the anomeric and primary positions had to be protected first. Once these positions are blocked, the acyl groups can be added with ease. The last two steps are then to remove the protecting groups, which yields the final product.

61. Scale Control in Oilfield Applications

Thomas Nagy (Ohio County, WV); Emily DeTemple

Institution: West Liberty University
Field: Chemistry
Faculty Advisor: Douglas Swartz

While the Northern Panhandle of West Virginia has a long history in the businesses of coal mining and steel production, advancing technologies have allowed hydraulic fracturing to arise as an effective method for extracting natural gas and oil in this area. Despite the abundance of natural gas deposits in the Marcellus Shale of northern West Virginia, using hydraulic fracturing to extract natural resources is not without its drawbacks. When HF flowback water moves through oilfield pipelines, it is highly saturated with metal cations from bedrock minerals which dissolved in solution during the fracturing process. These cations tend to precipitate out of solution as salts, therefore lining the insides of the pipes with scale and slowing the overall flow rate within the piping system. Since this issue can be very expensive to fix if not dealt with quickly, it is safer to simply avoid the chance of scale altogether by utilizing scale inhibitors. The goal of this experiment was to pre-treat the produced water with an oxidizer (Klear's organic-based peroxide 4035) to reduce the amount of metals in solution and then proceed to treat with scale inhibitor 5210 to reduce the scaling potential of any remaining metal cations.

62. From detection to complexation: Detecting and Removing Aluminum from Aqueous Solutions

Jessie Bowlin (Kanawha County, WV); Ciera Moles (Kanawha County, WV); Jeff Thompson (Kanawha County, WV)

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

Metal ions are one of the major pollutants and has entered into our rivers and streams through human activities and natural sources. These pollution sources include industrialization, mining, and dissolving rocks. Aluminum is a metal that is prevalent in today's society and has been potentially linked to several neurological disorders. We have been working on synthesizing several ligands that can be used to detect aluminum in freshwater through fluorescence spectrometry. Fluorescence spectrometry has attracted significant interest of the researchers due to its high signaling ability along with high sensitivity and selectivity. This method has been used in biological and environmental science for this purpose. Therefore, the design of sensors that are highly sensitive and selective for Al+3 has become vital. Additionally, work has been completed on the synthesis of pentaamino ligands that have been proposed to remove aluminum from aqueous solutions. This synthesis was completed through a three-step procedure to provide the desired ligand in 30% yield.

63. Finding Metal Oxides to Capture Solar Energy

Matthew Boothe (Calhoun County, WV); Saad Waseem (New Jersey)

Institution: West Virginia University
Field: Chemistry
Faculty Advisor: Erica Harvey

One of the main driving forces for our world today is energy. Obtaining energy in renewable ways that reduce or eliminate our carbon footprint is important for the future. The Solar Army is a nationwide group of researchers working to capture the energy in sunlight and use it to split water into a useful chemical fuel, hydrogen. The benefit of using hydrogen as a fuel is that, unlike traditional fuels, it has no carbon footprint. During an NSF-funded summer research internship at Fairmont State University, fifteen rural, first generation students headed to colleges around the state joined the WV Brigade of the Solar Army. The goal of the internship was to test different combinations of metal oxides and find ones that could potentially act as a catalyst in splitting water. Elements in the samples had to be cheap, abundant, and safe. Our team made samples containing a range of metal oxides in different ratios and tested them using instruments provided by the Solar Army. The SEAL (Solar Hydrogen Activity Research) kit tests for increase in electron flow in the system when the metal oxide is flashed with an LED light; this can indicate whether that specific metal oxide may be capable of splitting water. The HARPOON (Heterogeneous Anodes Rapidly Perused for Oxygen Overpotential Neutralization) kit tests for the metal oxide's ability to produce oxygen when a voltage is applied. A sample containing iron, chromium and strontium oxides showed promising results.

64. Identifying the determinants of Androgen Receptor Transcriptional Activity in Prostate Cancer

Christopher Roach (Ohio)

Institution: Marshall University
Field: Computer Sciences
Faculty Advisor: Wook-Sung Yoo

Prostate cancer is the third leading cause of cancer death in American men [1]. Approximately 11.6% of men will be diagnosed with prostate cancer at some point in their life and about 40% of them will have a reoccurrence of prostate cancer after being treated [2]. In prostate cancer, androgen receptor (AR) binding and androgen-responsive gene expression are defined by binding patterns of the pioneer factors FoxA1 and GATA2. Observations show that GATA2 positively regulates AR expression before and after androgen stimulation. It is also noted that GATA2 and FoxA1 both exhibit independent and codependent co-occupancy of AR target gene enhancers. Identifying the determinants of AR transcriptional activity could provide a foundation for the development of future prostate cancer treatments that target these pioneer factors. Our research is to identify overlapping binding sites among GATA2, FoxA1, and Androgen Receptors based on previous study results [3]. ChIP-Seq was collected and converted into a usable format. The data was then put through preprocessing steps so that the data would be clean and of good quality. The data was then put through alignment using a software called Bowtie which maps the data to the human genome, which allows us to see exactly where on the genome our ChIP-Seq data is at. Next, we identified peaks by visualizing the data using a software called MACS through a build-up of protein binding sites on the genome. Initial experimental data were collected and analyzed and future research direction is discussed.

65. Self Attacking Machine (SAM)

Adam Roberts (Cabell County, WV); Jason Lykins (Kentucky); Geoffrey Samples (Putnam County, WV)

Institution: Marshall University
Field: Computer Sciences
Faculty Advisor: Paulus Wahjudi

Self-Attacking Machine (SAM), is a cyber war simulation that has an easy setup and balances the difficulty amongst all participants. SAM uses scripts to implement exploits in Linux and Windows machines. SAM is contained in a virtual machine which allows the system to be run anywhere and reset if needed. The purpose of SAM is to get students familiar with exploits that hackers can use to exploit your system. SAM uses three tiers of difficulty: easy, medium, and hard. Each tier varies in the complexity of the exploit and the components affect in the system. The purpose of SAM is to provide a system that can provide the user a realistic environment that closely mimics what a typical cybersecurity threat. The framework also allows a standard mechanism for future challenges to be added to SAM. There are two additional features in SAM: Linux Utilities and Secure Internetworking Exercise (LUSIE) and SAM Jr. The LUSIE system provides training and exercise on Linux commands and web-server security. SAM Jr. is the kid friendly version of SAM that will let younger users to get the experience and understanding on the importance of computer security. SAM Jr. will spark interest among future generations as a gateway into computer science and cyber security.

66. Implementation of Connected Vehicle Technology for Congestion Reduction at Signalized Intersections

Carmine Parascandola (Pennsylvania)

Institution: West Virginia University
Field: Engineering
Faculty Advisor: Kakan Dey

According to The Federal Highway Administration, approximately 2.5 million accidents occur at intersections per year and have substantial economic and societal impacts. Transportation engineers do infrastructure improvement to not only reduce traffic congestion, but to reduce traffic conflicts and accidents. Current advanced and adaptive traffic signal phasing sensors improve signal operation efficiency, however, their detection range is very limited (less than 100 ft). The National Highway Safety Administration is in the process of mandating vehicle to vehicle (V2V) and Vehicle to infrastructure (V2I) connectivity, thus vehicle connectivity will become a reality in the next few years. Using the connectivity feature, vehicles will have the ability to communicate with other vehicles or with infrastructure such as traffic signals further upstream (about 900 ft from the intersection) and optimize signal timing to reduce congestion at intersections and improve traffic safety. VISSIM Microsimulation Software is a widely used traffic simulation software that provides the ability to model V2V and V2I supported connected vehicles. In this research, connected vehicles will be simulated into a VISSIM intersection network at different penetration rates. Overall and average delay in the network for different vehicle types (i.e., connected and non-connected vehicles) will be estimated in VISSIM simulation for different percentage of connected vehicle penetration levels compared to existing no-connected vehicle scenario. Comparing the vehicle delay (i.e. an indicator of congestion) for existing signal timing plan and proposed V2I supported signal timing, the effectiveness of the proposed concept will be evaluated.

67. Filter Sock Erosion Control for Unconventional Well Sites in West Virginia

Nathaniel Carlson (New York)

Institution: West Virginia University
Field: Environmental Studies
Faculty Advisor: Shawn Grushecky

Filter socks have come into wide use in oil and development activities in the Appalachian Basin as an erosion and sediment perimeter control technique. Filter socks are a contained filter berm constructed of a biodegradable mesh tube filled with a filtering media.   Specified use of composted materials during construction of filter socks has created inefficiencies during well site construction. Typically, during clearing and grubbing of a well pad site, discarded trees and tree tops are chipped on site and temporarily stockpiled. Then, composted chips are hauled onto well sites and used to fill filter socks during erosion and sediment control measures installation. The use of chips created on site, instead of hauling composted chips from supply yards, could reduce energy/capital costs, truck traffic, and disposal costs for woody material generated on site. The primary objective of this research project is to describe the characteristics of filter sock use on unconventional well sites in West Virginia. Using well development data supplied by industry partners metrics were developed for the average area of disturbance for unconventional well sites including the area cleared as well as the total quantity and characteristics of the filter sock used. Based on these metrics, analyses were conducted to determine the approximate level of trucking reductions that could be realized if chips created on site were used as a filter sock medium. These results suggest that the use of chips created during construction of well sites could significantly reduce truck traffic during development of unconventional resources.

68. Net Acidity and Water Quality Tests of Acid Mine Drainage Water from Morris Creek

Jacob Mosteller (Boone County, WV)

Institution: University of Charleston
Field: Environmental Studies
Faculty Advisor: Juliana Serafin

The Morris Creek Watershed Association maintains a passive limestone-bed treatment for acid mine drainage entering Morris Creek near Montgomery, WV.   Samples of treated acid mine drainage water from Morris Creek have been tested for net acidity using the "hot acidity" titration method, as well as for water quality using standard methods and flow rates. The net acidity of water is a measure of the highest acidity that water will reach due to dissolved components that can oxidize oxygen and produce protons. The water quality tests include pH, turbidity, temperature, total dissolved solids, biochemical oxygen demand, phosphates, total nitrates, and dissolved oxygen. For the two sites analyzed (upper and lower main stem), the titrations show a decrease in net acidity as the treatment progresses. The hypothesis of this study is that the results for the water quality index tests for dissolved oxygen, biochemical oxygen demand, and dissolved solids are related to the net acidity.

69. Comparison of Commercial Touch DNA Extraction Systems Utilizing the Polymerase Chain Reaction Technique

Hannah Nelson (Pocahontas County, WV)

Institution: Fairmont State University
Field: Forensic Science
Faculty Advisor: Mark Flood

Forensic scientists often generate genetic profiles from old blood stains, seminal stains, and hair, but an individual's genetic profile has been accomplished from surfaces touched by human hands. This "Touch DNA" potentially allows for the sensitive identification of DNA from crime scenes where fingerprints are found. The experiment was designed to determine the sensitivity of DNA isolation from fingerprints placed on glass. The two kits that were used in this experiment were the Invitrogen ChargeSwitch® Forensic DNA Purification Kit and the Promega DNA IQ™ Kit. The Invitrogen ChargeSwitch® system provides an efficient method for isolation of nuclear DNA from a range of forensic samples. The Promega DNA IQ™ system is used to isolate all types of DNA from liquid and solid-support samples. Both systems provided a protocol that claimed to facilitate isolation of genomic DNA from fingerprints. After touching cleaned glassware with varying numbers of fingerprints, DNA isolation was performed using each of the above listed kits. Isolated DNA was amplified with the highly sensitive polymerase chain reaction (PCR) technique, and separation of the PCR products occurred on an agarose gel. The two kits successfully isolated sufficient DNA from cheek swabs, and the Promega DNA IQ™ system was found to be more sensitive to DNA contamination. However, the two commercial kits did not successfully extract a sufficient quantity of Touch DNA from a non-porous surface coated with fingerprints. Future experiments should be performed using Touch DNA samples on different surfaces to determine if DNA isolation efficiency can be improved.

70. Using Volcanic Ash to Constrain the History of Ice-Age Lakes at Summer Lake, Oregon.

Cameron McNeely (Fayette County, WV)

Institution: Concord University
Field: Geography/Geology
Faculty Advisor: Stephen Kuehn

During the ice ages, many large lakes existed in the western United States in an area known as the Great Basin. This area includes Nevada, Utah, Oregon, and Eastern California; nearly all of this land is desert today. As large ice sheets advanced across the continent and then melted away, these lakes expanded and dried up over time. These lakes contain a long-term record of multiple ice age cycles and the related changes in water availability alongside changes in regional ecology. Most available data on these lake fluctuations only capture relative changes in water level. At Summer Lake, Oregon, we have found that exposures of ancient lake sediments at different elevations make it possible to determine the water levels at different times. Preserved lake sediments at a site indicate that the area was under water, and evidence of erosion indicates when the lake level was below the site elevation. Using field-based research in Oregon to document lake levels and analysis of volcanic ash layers for age information using Concord University's electron microprobe, we are able to correlate between different locations and determine a timeline for the changing water levels. This data will make it possible to do more quantitative modeling of the causes of changes in water availability.

71. Mapping and Morphometrics of Ancient Glacial Landforms in central Namibia

Andrew McGrady (Lincoln County, WV)

Institution: West Virginia University
Field: Geography/Geology
Faculty Advisor: Graham Andrews

Continental-scale glaciations, such as the glacier that covered much of the super-continent Gondwana, leave behind a record of characteristic deposits and erosional landforms. Through geological time ancient glacial deposits are often transformed or removed, and are difficult to identify without detailed, up-close examination. Erosional landforms like drumlins (hills carved into bedrock by moving ice) and megagrooves (channels eroded into bedrock by ice), on the other hand, can be distinguished from a distance based on their size compared to neighboring bedrock and their elongated shape, making them ideal records of ancient glaciations on Mars and many remote parts of Earth. By studying the sizes and shapes of a suite of glacial landforms from the Pleistocene epoch (most recent period of glaciation) in Canada and Scotland, we can classify and interpret the origins of ancient drumlin-like and megagroove-like landforms in Namibia (southern Africa) and other remote parts of Earth, as well as Mars, respectively.

72. Optimizing Refuse Collection In Huntington, WV

David Hannan (Cabell County, WV); Steven Rollins (Kanawha, WV)

Institution: Marshall University
Field: Mathematics
Faculty Advisor: Michael Schroeder

Garbage collection is an essential, but often overlooked service offered by a municipality. The City of Huntington Public Works Department has long known that the current garbage collection routes are unequal, leading to some crews doing more work than others, leading to some trucks collecting heavier loads than others on a given day. We worked alongside them to confirm this observation and, if necessary, suggest route changes to balance out the workload. This paper describes research conducted with the goal of balancing the existing garbage collection routes. To accomplish our goal, we obtained customer and route data from the Public Works Department as well as economic data from both Huntington's Office of Planning and Zoning and the latest census. We then consolidated all of this information in a single file at the parcel level in order to create a linear regression model, which was used to predict a household's refuse production. Using this model and an optimization routine we wrote in Python, these households were shifted between routes in order to find the optimal balanced configurations.

73. Treating Staphylococcus aureus Biofilm with Silver Nanoparticles and Conventional Antibiotics.

Austin Paul-Orecchio (West Virginia)

Institution: Bethany College
Field: Other (Biomedical)
Faculty Advisor: Bingyun Li

The formation of Staphylococcus aureus (S. aureus) biofilms on prosthetic devices and bone are difficult to treat and may cause chronic and recurrent infections. Severe infections result in surgical procedures, which become expensive. Antibiotics are one of the standards of treatment for these infections, but one concern is the increasing prevalence of antibiotic-resistant bacteria. Thus, there is a need for new treatment agents. One promising solution is silver nanoparticles, as they have been shown to have excellent antimicrobial properties against a broad spectrum of pathogens and against biofilms. One area that needs further research is in determining the synergistic effects of silver nanoparticles and antibiotics. Thus, in this project silver nanoparticles and conventional antibiotics (vancomycin and rifampin) were used to treat S. aureus biofilms individually and in combination at various concentrations and treatment intervals. After treatment of the biofilms, the number of colony forming units were quantified and compared with negative controls. (Supported by NIH Grant P20GM103434 to the West Virginia IDeA Network for Biomedical Research Excellence)

74. Monoacylglycerol lipase inhibition blocks gastric hemorrhages induced by the cyclooxygenase inhibitor diclofenac sodium

Hunter Aliff (Kanawha County, WV); Emily Silvestri (New Hampshire)

Institution: West Virginia State University
Field: Other (Biomedical)
Faculty Advisor: Steven Kinsey

The endogenous cannabinoid system possesses several potential targets to reduce gastric inflammatory states, including gastric hemorrhages (i.e., gastric ulcers), which can pose serious health risks in certain populations (e.g., elderly or chronically ill). Of particular interest is the endocannabinoid ligand, 2-arachidonoylglycerol (2-AG) arachidonoylglycerol, which has shown some promise as a potential therapeutic target in reducing gastric hemorrhages through cannabinoid receptor 1 (CB1) activation. While effective, increases in endogenous 2-AG are only possible through the use of monoacylglycerol lipase (MAGL) inhibitors, which have negative side effects that hinder their use in humans. Positive allosteric modulators (PAMs) offer an alternative approach to enhance CB1 receptor function for therapeutic gain. In the present study, either a MAGL inhibitor, JZL184, or a CB1 PAM, ZCZ011, were used to attempt to attenuate gastric hemorrhage formation in two models of hemorrhage induction. Mice were fasted for 24 hr, administered JZL184 (40 mg/kg), ZCZ (10, 20 or 40 mg/kg), or vehicle (1:1:18; ethanol:Kolliphor EL:saline), and hemorrhages were induced 2 h later using either ethanol or the nonsteroidal anti-inflammatory drug diclofenac sodium (100 mg/kg, p.o). Stomachs were harvested, hemorrhage length was quantified, and myeloperoxidase (MPO), a byproduct of neutrophils, was quantified via ELISA. Ethanol or diclofenac induced gastric hemorrhages, in accordance with previous literature. MAGL inhibition significantly attenuated diclofenac- but not ethanol-induced gastric hemorrhages, indicating that the anti-hemorrhagic efficacy of indirect CB1 activation is a function of hemorrhage induction method.

75. Feasibility of Participant Recruitment and Health Indicators of Individuals with Disabilities Using Social Media

Carson Purcell (Maryland); Tessa Shaffer (Pennsylvania); Ashley Tyler (Jefferson County, WV)

Institution: West Virginia University
Field: Other (Disability Research)
Faculty Advisor: Jason Bishop

The health effects of transition to adult living among those with chronic mobility impairment is a current rehabilitation research priority (CMRR, 2016; NIH, 2016). People with chronic mobility impairment often experience significant but preventable secondary health conditions in response to their impairment (Froelich-Grobe, 2016). As a result, they have greater health disparities compared to their non-disabled peers (Krahn, et al., 2015). Increasing the health and function of this population through effective health promotion programing has been a federal research priority since the passing of the Rehabilitation Act of 1973. The health effects of the transition from high school to independent living among those with chronic mobility limitations residing in rural settings is yet to be explored. Many health promotion programs for people with disabilities take place in areas with a high density of this population (e.g., Chicago, IL; Birmingham, AL). However, acquiring this population in rural areas such as the Appalachian region is very challenging. Acquiring research participants who have chronic mobility limitations to implement and test health promotion programs is a multifaceted challenge. Social media may be one approach to reach potential rehabilitation research participants residing in rural settings to conduct scientific inquiry. Many people with disabilities utilize technology, including social media, to communicate with friends and family. Our feasibility study will test the effectiveness of using the no-cost social media platform, Facebook, to recruit research participants transitioning from high school with chronic mobility limitations to complete an on-line health indicator survey.

76. A Microbial Assay Using *Acanthamoeba castellanii* to Investigate the Interaction of Phagocytes with Bacteria

Joshua Burnette (Cabell County, WV); Luca Brambilla (Wood County, WV)

Institution: Marshall University
Field: Other (Microbiology)
Faculty Advisor: Wendy Trzyna

Various rodents, such as mice, have been used as models for human disease since the 16th century, and have been instrumental in the discovery of many biological processes, which have contributed to advancements in the understanding, treatment, and prevention of many diseases and conditions. However, the use of mammalian models is often costly and remains fraught with ethical issues. Microbes, such as bacteria and protozoa, are alternative model systems that mitigate many of these issues. *Acanthamoeba castellanii* is a single-celled eukaryotic microorganism that is ubiquitous to nearly all aquatic and terrestrial environments. These amoebae are maintained in laboratory culture either axenically or in co-culture with bacteria as a food source. A unique characteristic of this organism is their ability to transition from an active to a dormant form, which consists of a double walled cyst that forms under stress and is highly resistant to harsh environmental conditions. *Acanthamoeba* also exhibit multiple different interactions with bacteria; either phagocytosing bacteria as food, harboring them as endosymbionts, or the bacteria may kill the amoebae. Using these collective features, we developed a microbial plating assay that we have used to evaluate the effect of environmental contaminants on growing and dividing cells. Here we have adapted this assay to investigate the effect of both pathogenic and nonpathogenic strains of Pseudomonas aeruginosa on single cells. These current studies on the interaction of *A. castellanii* with various bacterial species, may contribute to a greater understanding of how pathogenic bacteria affect macrophages and other phagocytic cells of the immune system.

77. Effects of Prior Anxiety Level on Nicotine Place Conditioning in Adolescent Female Rats

Chana Patterson (Mercer County, WV)

Institution: Concord University
Field: Psychology
Faculty Advisor: Adriana Falco

There are many changes occurring during adolescence, not only in the body but the brain as well. With the changes that are taking place, adolescents are more vulnerable to the effects of nicotine. Individuals who start smoking during adolescence have a greater addiction liability and greater difficulty quitting than do individuals who delay use until adulthood. Little research has been done pairing anxiety to nicotine reinforcement in adolescent female rat models. This study aims to examine the relation between prior levels of anxiety and reactivity to nicotine in a place conditioning apparatus. Female adolescent Sprague-Dawley rats (P 30) were divided into high anxiety and low anxiety groups using the elevated plus maze along a median split. High anxiety rats were compared to low anxiety rats for their reactivity to nicotine versus saline controls during acquisition of a biased place conditioning paradigm. The findings of this study were a small non-significant increase in the high anxiety nicotine subjects with non-significant decreases in the control and low anxiety nicotine subjects. The results suggest that more research needs to be done.

78. Effects of Traumatic Brain Injury on Gambling-like Behavior in Rats

Trinity Shaver (Pendleton County, WV); Binxing Zhu (West Virginia)

Institution: West Virginia University
Field: Psychology
Faculty Advisor: Cole Vonder Haar

Traumatic brain injuries (TBI) can cause long-term deficits, including alterations to decision-making. Risk-based decision-making is the ability to evaluate probabilistic outcomes, which are a component of everyday life and financial decisions. Dysregulation of risk-based decisions can lead to chronic problems such as gambling disorder. These types of decisions can be evaluated in humans using the Iowa Gambling Task, and replicated in rats using the Rodent Gambling Task (RGT). In the current study, we evaluated the effects of a TBI on risk-based decision-making in the RGT. Rats chose among low-risk options, with a high probability of receiving a small reward, and risky options, with a large reward, but low-probability. Brain injury shifted preference towards risky choices, reduced learning rates, and altered typical responses to dopamine-stimulating drugs. These data suggest that rats can be used to study facets of decision-making after TBI that are relevant to humans, and this may lead to the development of therapeutics that could help those with brain injury and gambling disorders.

79. Effects of jasmine scent administration on increasing community service participation attitudes

Sabrina Soriano (California); Albert Schrimp (Ohio County, WV)

Institution: Wheeling Jesuit University
Field: Psychology
Faculty Advisor: Bryan Raudenbush

Past research indicates the consumption of L-Tryptophan (TRP), the biochemical precursor of 5-HT, produces changes in mood, decision-making behaviors, and interpersonal trust. For example, participants reported fewer negative impacts and more positive impacts of performing community service after the consumption of TRP. The present study assessed if such physiologically-based results could be replicated with scent administration. Participants (n=90) first completed the Profile of Mood States (pre-test, to assess current mood). They were then exposed to no scent, peppermint scent, or jasmine scent prior to completing a questionnaire concerning their views on the positive and negative aspects of community service. After completing the questionnaire, participants again completed the Profile of Mood States (post-test). Results showed a significant decrease in ratings for anger [$F(1,90)=27.31$, $p=.000$], confusion [$F(1,90)=11.75$, $p=.001$], depression [$F(1,90)=13.13$, $p=.000$], fatigue [$F(1,90)=20.25$, $p=.000$], tension [$F(1,90)=13.40$, $p=.000$], and vigor [$F(1,90)=7.91$, $p=.006$] between the pre- and post-trials for all conditions. In addition, a significant difference in ratings for positive views of community service were found between the jasmine scent condition and the other conditions, with participants in the jasmine scent condition indicating a more positive view of community service, $F(2,90)=7.47$, $p=.001$. There was also a trend for negative views of community service to decrease in the jasmine scent condition, $F(2,89)=2.21$, $p=.054$. These results suggest jasmine scent administration can increase the positive and decrease the negative connotations of community service. Future research should track actual participant community service once they have been presented with jasmine scent.

80. Effects of l-tryptophan consumption on racial attitudes and acceptance

Juan Pablo Troconis Bello (Venezuela)

Institution: Wheeling Jesuit University
Field: Psychology
Faculty Advisor: Bryan Raudenbush

Past research indicates the consumption of L-Tryptophan (TRP), the biochemical precursor of 5-HT, can produce significant changes in mood, decision-making behaviors, and interpersonal trust. For example, participants who consumed TRP prior to a mutual trust game transferred significantly more money to their partners in the game. In another study, they reported fewer negative impacts and more positive impacts of performing community service. The present study assessed the consumption of TRP on attitudes towards different races and racial acceptance. Participants (n=66) were administered either 200 mL of orange juice (the control condition) or 200mL of orange juice to which 0.8 g of TRP had been added (the experimental condition). After one hour, participants completed a variety of questionnaires related to personality and mood, and rated pictures of African American, Caucasian and Middle Eastern individuals on various dimensions. The results showed that participants in the TRP experimental condition showed less variability in their responses related to racial acceptance; however, differences between the control and experimental conditions were not as uniform as the researchers had predicted. Racial perceptions and acceptance may be more trait- rather than state-oriented, such that administration of TRP does not have as marked an effect.

SOCIAL SCIENCES

81. A Peak Inside Boko Haram's Recruitment Methods and Tribes Surrounding the Lake Chad Basin

Kayla Plauger (Mineral County, WV); Sasha Sampson (Ohio); Ryan Patrick (Kanawha County, WV)

Institution: Fairmont State University
Field: International Studies
Faculty Advisor: Todd Clark

This year, Fairmont State University's Open Source Intelligence Exchange (OSIX) Laboratory is researching and compiling data on the recruitment methods of militant Islamic group, Boko Haram, in correspondence with African tribes around the Lake Chad Basin in Eastern Africa. OSIX undergraduate analysts are partnering with NURU international-a non-profit organization working in community development in third world countries- to support a NURU sponsored project focused in Northern Nigeria. By using traditional open sources, such as databases and websites, OSIX analysts are able to compile the information that is needed to complete NURU's project. The final project completed by OSIX analysts is a comprehensive research paper on Boko Haram and the forces and factors that lead to recruitment in Northern Nigeria as well as a visual presentation on the tribal make-up of the Lake Chad Basin. The research paper addresses forces such as socio-economic and governmental factors as well as the role of women in Boko Haram. The visual presentation on the tribal make-up of the Lake Chad Basin will be constructed using Prezi-a conversational presenting platform-and describe the demographics of each tribe around Lake Chad. Armed with the data furnished by OSIX analysts, NURU International will be well-positioned to commence its humanitarian operations in Northern Nigeria.

82. Richwood, West Virginia Health & Safety Needs Assessment

Amber Trickett (Marion County, WV); Candice Travis (Harrison County, WV)

Institution: Fairmont State University
Field: Other (Community Health)
Faculty Advisor: Amy Sidwell

The Richwood, West Virginia Health & Safety Needs Assessment was completed as part of a class research project in the Fall 2016 semester in a Community Health Education course entitled Community Needs Assessment. The purpose of the research was to determine Richwood residents' biggest health and safety concerns following historic flooding that occurred in June 2016. Prior to the flood, there were approximately1,980 Richwood residents (US Census Bureau, 2015). From October to November 2016, 38 Richwood residents participated in an electronic survey, 14 community stakeholders participated in interviews, and a focus group was held with 5 Richwood residents. Major findings from the study included: hazard mitigation (including mold, debris, water and sewer infrastructure, and vermin control) were cited as important considerations; healthcare concerns included mental health care, the loss of the nursing home, and transportation to medical facilities; access to fresh food was limited; and, many people who were interviewed and participated in the survey indicated they were concerned about drugs. While recommendations for addressing these issues were provided, residents and stakeholders attending a community forum on December 1, 2016 set priority areas for the Community Health Education students to address January through May 2017.

83. Community Assessment and Education to Promote Behavioral Health Planning and Evaluation (CAPE): WV Results

Rachel Wattick (Pennsylvania)

Institution: West Virginia University
Field: Other (Public Health)
Faculty Advisor: Melissa Olfert

Behavioral health disorders, including mental health and substance use disorders, affect 20% of the U.S. population. Addressing these issues is especially pertinent in West Virginia (WV) as nearly 22% of adults have a mental illness and WV reports the highest overdose death rate (41.5/100,000) in the nation. Clinicians and healthcare workers in the behavioral health field report a lack of resources available to guide their programs; this has been partly attributed to the time it takes for research findings to be translated into practice (~20 years). To address this discrepancy between evidence obtained from research and program implementation, the USDA and SAMHSA established Community Assessment and Education to Promote Behavioral Health Planning and Evaluation (CAPE). Phase I of CAPE compiled behavioral health data from communities and created tools to address behavioral health issues. Phase II aimed to implement affordable, replicable, and adaptable community-level interventions for behavioral health. In Phase I, Kanawha County, WV created a behavioral health snapshot and report (available online) and in Phase II addressed the high prevalence of grandparents caring for grandchildren by holding a training session for grandparents (n=7) on how to talk with grandchildren about drugs. Cabell County, WV addressed its high substance abuse and overdose rates with a day-long training session for behavioral health workers (n=150) and also established a lending library. Results from CAPE demonstrate that compiling data and tools into an accessible resource can empower communities in West Virginia to develop relevant, timely interventions to address important behavioral health problems.

84. Analyzing Revisions to Inform Composition Improvement

Audrey Weiss (Monongalia County, WV); Nathan Altman (Kanawha County, WV)

Institution: West Virginia University
Field: Other (Educational Psychology)
Faculty Advisor: Melissa Patchen

Education in the U.S. is severely lacking in the domain of writing. Seventy-four percent of high school seniors in the U.S. fail to meet proficient writing standards (Nation's Report Card, 2011). Moreover, poor literacy is linked to lower socio-economic status and higher likelihood of being on government welfare (Adult Literacy in America, 2002). Revision is an important part of the writing process by which writers can improve their own compositions. The purpose of the present study is to identify which types of revision lead to the greatest improvement in quality of writing. Data was collected from students (n = 111) enrolled in a college-level history course. Students completed two drafts of an essay, which were scored by experts for flow, logic, and insight. Revisions between the drafts were extracted and coded across two levels. First, revisions were coded as either text-based changes, which change the meaning of the text, or as surface changes, which do not. Text-based changes were then coded into macro-structure changes, which affect the way the composition is understood, and micro-structure changes, which do not. Surface changes were coded into formal changes, which help the text align with rules of writing, and meaning-preserving changes, which are neither formal changes nor affect the meaning of the composition. Preliminary results show that writers with greater improvement between drafts employ text-based and macro-structure changes more frequently than writers with little or no improvement in scores. Educators could use these data to inform students on how to revise more effectively.

85. The President and the Media: Best Frenemies

Kelsey Allbright (Mason County, WV)

Institution: University of Charleston
Field: Political Science
Faculty Advisor: Kara Fisher

According to recent literature in the social sciences, the relationship between the President of the United States and the media has become increasingly complex. With the increased reliance on technology and use of social media, both the modern media and public officials have been forced to adapt to new modes of accessing and sharing information. However, it is apparent that the relationship between the president and the media has become contentious as they each have adapted to modern advancements in different ways. Milligan (2015) finds that in the case of President Obama, even positive relationships deteriorate over time. Thus, my analysis will describe how the relationship between the president and the media has evolved, by tracking and evaluating how the president's chosen methods of communication are illustrated through positive media coverage.   Specifically, through a comparative case study of President Obama and President Trump, I will highlight the evidence of complex and controversial interactions between the president and the media and the contributing indicators. I will evaluate this relationship by comparing each president's first one hundred days in office, and I will analyze the methods of communication that each president used during that time-period. The data is comprised of reports complied from the American Presidency Project, The Public Papers of the Presidents and the Pew Research Center. Preliminary data suggests that as presidents begin to utilize unconventional means of communication, such as direct communication with the public through social media, positive media coverage decreases.

86. Unaffiliated and Independent Voters In West Virginia: The Millennial Perspective

Carissa Sellards (Kanawha County, WV)

Institution: University of Charleston
Field: Political Science
Faculty Advisor: Brad Deel

This research focuses on the increased number of unaffiliated and independent voters in West Virginia over the last decade, with particular attention to millennials. I will utilize recorded voter registration data reported in the West Virginia Secretary of State's database. This case study will identify the indicators of millennial voter behavior and the decline of influence for the dominant two-party system. I employ a systemic approach including extensive research of voter registration information to analyze the nearly 100,000 person increase in unaffiliated registrations from 2007 to 2017. In addition, the aim of this case study is to investigate the political climate resulting in unfavorable attitudes toward both Republicans and Democrats among millennials. I will identify the changes in the count of both Republican and Democrats registered in the state, as well as electoral outcomes during these years. For the first time in nearly forty years, baby boomers are not the largest generation of eligible voters. As this circumstance marks a significant change in the political environment, I will also examine the pool of eligible voters in relation to the number of registered voters for both age groups. This case study will provide a snapshot of this critical sector of the electorate in hopes that elected officials may better represent the interests of young adults in West Virginia.

87. Assessment of Police Interactions with Individuals with Mental Illness

Chelsea Wallen (Raleigh County, WV)

Institution: Marshall University
Field: Psychology
Faculty Advisor: Christopher LeGrow

The purpose of the research is to examine college students': (a) attitudes towards law enforcement, (b) attitudes towards individuals with mental illness and (c) perceptions of the factors that contribute to the use of deadly force by police officers during interactions with individuals with mental illness. The survey that participants will be asked to complete is divided into four parts. In Part A of the survey, participants will be asked to provide demographic information (e.g. age, gender, college major, ethnicity, class standing, and political orientation). In Part B of the survey, participants will be asked to provide responses to 5 items assessing attitudes towards law enforcement. In Part C of the survey, participants will be asked to provide responses to 40 items assessing attitudes towards individuals with mental illness using a 5-point rating scale (1 = Strongly Disagree; 5 = Strongly Agree). Finally, in Part D of the survey, the participants will be asked to read 4 scenarios describing police interactions with individuals with mental illness that ended in the use of deadly force by the police. For each of the 4 scenarios, participants will be asked to provide an opinion as to whether the police were justified in the use of deadly force and describe in a short, written response why police were or were not justified in the use of deadly force based on the facts presented in the case.

88. Love Styles and Perception of Relationships

Stacie Hall (Kanawha County, WV); Sydney Hughes

Institution: University of Charleston
Field: Psychology
Faculty Advisor: Michael Bayly

This study will examine how desirability of love styles influences the perceptions of the long-term success of the relationship. John Lee was a sociologist and psychologist who suggested that there six individual approaches to love, called "love styles." Three of the styles, eros, storge and ludos, are considered primary, and three pragma, mania and agape, secondary. The secondary love styles result from combinations of the primary love styles (Lee, 1976). In my study, participants will complete a basic demographic questionnaire. Following, participants will be randomly assigned to watch one of six short, scripted videos, which were completed in an interview fashion that combine sex of confederate with one of three love styles. The loves styles used are eros, ludos, and pragma. Eros and ludos were selected because they represent extreme love styles, and pragma falls somewhere in the middle. The videos ask the confederates questions pertaining to their current relationship. After watching the video, participants will complete a Likert-type survey with a scale ranging from one to seven. I expect the male ludic will be the most common love style for men, suggesting that participants will view it to be the most stereotypical of males in their age range. For women, I believe that the eros female will be seen as the most common and stereotypical because it the most common love style in college age adults. Last targets will be evaluated as more successful at love when their love style is in sync with their sex.

89. The Psych Out Program: A Mobile Educational Program

Michelle Yadrick (Hancock County, WV); Moriah Chicoine (Hancock County, WV)

Institution: West Liberty University
Field: Psychology
Faculty Advisor: Tifani Fletcher

"Psych Out" is a program created and implemented by upper level undergraduate students at our institution to fill the need of additional exposure to psychology-related content and career paths to community members. Psychology is among one of the most popular majors on college campuses; however, familiarity with what psychology entails as a STEM field is minimal within K - 12th grade institutions, particularly in rural locations. A toolbox of relatively brief, hands-on activities from diverse subfields of psychology was compiled. This toolbox includes specific instructions, materials, and time requirements, appropriate grade level explanations, and learning outcomes for each activity. This endeavor is similar to the traveling psychology fair (Johnson & Mandernach, 2006). Faculty, administrators, or teachers can choose which activities are presented based on desired content, time availability, interests of participants, or a combination of considerations. The undergraduate students continually update the toolbox with additional activities and restructuring of current activities based on feedback from participants. A brochure of the program including descriptions of example activities is currently being created. Example of activities include: Dollar Drop, Human Knot, Emotion Cookies, Benhem's top, and inkblot creations. This program has been used several times over the last year and a half with local high school and elementary school students in various capacities. Feedback regarding the program has been very positive. Future directions include the expansion of the program, including additional outreach to the community, and a formalized program evaluation.

90. The Correlation Between Income and Length of Intervention in Parent-Child Interaction Therapy

Hannah Coffey (Berkeley County, WV); Kelsey Eackles (Jefferson County, WV); Maggie Ruckle (Monongalia County, WV)

Institution: West Virginia University
Field: Psychology
Faculty Advisor: Cheryl McNeil

One of the largest referrals to mental health care providers for children between the ages of 2-7 years is severe externalizing behaviors (Eyberg, 1992). Evidence shows that the most effective intervention for children experiencing these concerns is parent training. Specifically, Parent-Child Interaction Therapy (PCIT) is an evidence-based treatment for families with children 2-7 years old who have significant difficulties with disruptive behaviors. PCIT has been shown to effectively improve the parent-child relationship, increase child compliance, reduce child aggression, and improve parental stress (McNeil & Hembree-Kigin, 2010). Unfortunately, while PCIT is highly effective for families who complete treatment, the attrition rate has been shown to be high in community mental health settings. Important factors that contribute to early termination of services include socio-economic status and positive and negative maternal verbalizations (Eyberg & Fernandez, 2009). The current study addresses whether family income has an impact on the amount of time families spend in PCIT and if differences are present at pre-, mid-, and post-treatment. This study uses data collected from Prevention Early Intervention in Riverside, California in collaboration with West Virginia University. This study will assist in determining if income is a significant contributor to success in PCIT and, with reference to past studies, why this may be the case.

91. Investigating Non-Traditional Predictors of College Attrition

Carinna F. Ferguson (Barbour County, WV)

Institution: West Virginia University
Field: Psychology
Faculty Advisor: Amy Gentzler

Traditionally, high school GPA and standardized tests scores are used to predict success in college. The current study investigated less studied variables using longitudinal data from a sample of college freshman (N = 533). We found that specific variables (stress, concentration, test preparation, test anxiety, and life satisfaction) predicted retention at different times across the students' first two years. Even when controlling for institutional risk, the non-traditional variables were uniquely important in predicting college retention. Regarding retention rates for the first semester, institutional risk (IR), perceived stress, concentration, and test preparation all significantly predicted participants' likelihood to come to school the first semester. Regarding retention rates for the second semester, IR and test anxiety significantly predicted participants' likelihood to return to school after two semesters. Regarding retention rates for the start of the second academic year, IR and life satisfaction significantly predicted participants' likelihood to return to school after three semesters. Thus, distinct variables were significant in predicting college retention during different semesters in the study. These results highlight the importance of providing students with skills not only in academia, but also in preparing students for the stressful life changes that come with transitioning to college. Furthermore, the changes in the type of significant variables across semesters suggest a need for programs to help students with the stress associated with academic skills, as well as facets of well-being, especially in the long-term.

92. The Influence of Astrological Beliefs on Susceptibility to the Barnum Effect

Jamie Cook (Wyoming County, WV)

Institution: West Virginia University Institute of Technology
Field: Psychology
Faculty Advisor: Cynthia Hall

The degree to which an individual believes in astrology may influence the degree to which that individual is susceptible to the barnum effect, or the degree to which a person considers generic, vague personality profiles to accurately describe their own personality traits (O'Dell, 1972). A correlation between these two variables can already be seen in horoscopes that, while addressed to a single sign, are not specific and instead could be applicable to almost everyone (Morain, 1988) These two variables may also form a sort of cycle, where belief in astrology causes one to be more susceptible to the barnum effect, which in turn may only strengthen that belief if presented in an astrological context (Fichten & Sunerton, 1983; Morain, 1988). The present study examines the relationship between belief in astrology, tendency toward magical thinking, and the barnum effect. It is expected that greater belief in astrology and tendency toward magical thinking will be associated with greater susceptibility to the barnum effect. Specifically, participants who score high on the magical thinking and astrology will be more likely to rate vague personality statements as more accurate compared to participants who score low on magical thinking and astrology. Data collection is in progress and expected to be complete by December 2017.

93. Socio-Economic Risk and College Adjustment: Examining Emotion Regulation as a Protective Factor

Taija Thomas (Hardy County, WV)

Institution: West Virginia University
Field: Psychology
Faculty Advisor: Amy Gentzler

First-generation college students and low-income students have more challenges while transitioning to college than other students (Stephens, Hamedani & Destin, 2014). We hypothesized that better emotion regulation would offset risks for these students. The current study examined psychological adjustment in college freshmen using the College Student Transition Study (N = 489). Analyses indicated that low perceived socio-economic status was associated with higher stress (r = -.313, p = .01) and depressive symptoms (r = -.294, p= .01). Counter to our hypothesis, the participants level of emotion regulation did not affect the associations between socio-economic risk and psychological difficulties. We did, however, find that good emotion regulation skills (i.e., more reappraisal where people positively change the way they construe an emotional situation) were associated with lower levels of stress (r = -.313, p = .01) and depression scores (r = .187, p =.01). The findings of this study highlight the negative impact that perceived socio-economic status can have on psychological well-being in college students. This study also shows the positive impact that good emotion regulation has on psychological well-being, with reappraisal being linked to better adjustment and suppression (withholding behavioral expressions of emotion) being associated with stress and depressive symptoms. This research provides implications for future programs that focus on providing low SES students with emotional support as well as emotion regulation training. In the future, more research should be done to see what other factors may buffer the impact of socio-economic risk on college psychological adjustment

94. Understanding Sexual Assault Disclosure Reactions from Informal and Formal Support Providers

Kaity Foster (Berkeley County, WV)

Institution: West Virginia University
Field: Sociology/Social Work
Faculty Advisor: Kathryn Burnham

The prevalence of sexual assault in the US has left many questioning what's being done to ensure the safety and anonymity of a person if they were to ever experience this heinous crime. Not only is the prevalence of sexual assault a pressing issue, prior research has found that the reactions survivors of sexual assault face when disclosing the incident to others can influence their recovery and that disclosure experience varies greatly. Using data from a content analysis of submissions from an online awareness campaign, Project Unbreakable, this study seeks to explore whether the type of response – positive or negative - received when the survivor discloses their victimization experience differs based on the relationship type – formal or informal – between the survivor and support provider. Findings indicate that of the 176 cases, only 17 of them contained positive reactions from support providers. All, but one, positive responses were from informal support providers, mainly friends, with only one positive response coming from a formal support provider. The other 159 cases received negative responses from informal and formal support providers. With the exception of the one positive response, every time a sexual assault experience was disclosed to a formal support provider it was met with a negative response. A Chi2 analysis indicates that the relationship between type of support provider and type of reaction was not statistically significant. A potential reason for this is because a vast majority of the disclosure responses were negative, regardless of who they came from.

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95. Potential Effects of Opioids on Expression of Genes Related to Opioid Signaling and Neurodevelopment

Bradley Muncy (Mingo County, WV); Jordan Taylor (Wayne County, WV); Ramin Garmany (Kanawha County, WV)

Institution: Marshall University
Field: Biology
Faculty Advisor: Phillipe Georgel

While the opioid epidemic has a broad reach in its effect on the residents of southern West Virginia, an especially high concern is evident in the prevalence of Neonatal Abstinence Syndrome (NAS) at Cabell Huntington Hospital. NAS is a condition classified as physiological and biochemical dependence of an infant on substances abused by the mother during pregnancy. This is commonly treated with an opioid called buprenorphine. Typically, treatment is administered in utero and over time decreased to subside the infant's dependence on opioids developed throughout pregnancy. Although buprenorphine is successful in alleviating immediate stress to a neonate, the drug's role in neurological development has been shown to affect the development of a newborn's brain. We hypothesize that opioid exposure congruent with dosages equivalent to those to which developing children are exposed during pregnancy (50ng/mL), could potentially result in differences in gene expression via post-translational modifications of histones. We have investigated changes in levels of post-translational modifications of histones over increased exposure to buprenorphine at time points (0,2,12,24, and 48 hours) across two model systems: rat brain microvascular endothelial cells and oligodendrocyte precursor cells. Additionally, investigations of expression levels of specific genes involved in brain development, gene expression, and the opioid pathway are currently being held and analyzed through the utilization of qPCR. The quantitative analysis of changes in the level of mRNA for the treated (buprenorphine exposed) cells relative to the control may provide insight on the effect of buprenorphine in neurological development as well as disorders associated with NAS.