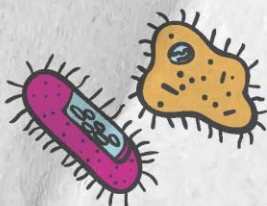
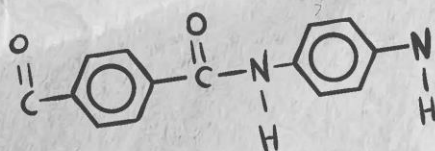


# 14<sup>th</sup> Annual Undergraduate **RESEARCH** **DAY AT THE** **CAPITOL** | February 24, **2017**



WEST VIRGINIA STATE  
UNIVERSITY

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

House #	Participant		Poster #
1	Cassidy	Bland	27
	Haley	Harper	105
	Brian	Miller	93
	Megan	Nally	71
	Deben	Shoup	72
2	Hunter	Armstead	45
	Miranda	Buckley	48
	Moriah	Chicoine	99
	Moriah	Chicoine	110
	Victoria	Ramey	48
	Anika	Rowe	41
	Lesli	Taylor	111
3	Savannah	Austen	29
	Rishi	Chandrasekhar	65
	Haley	Kleinedler	99
	Brett	Szeligo	74
	Elana	Zambori	116
4	Joseph	Richmond	15
	Janelle	Vickers	39
5	Anne	Belldina	62
7	Lindsey	Shingleton	3
8	Logan	Cox	67
	Jacob	Douglas	4
	Megan	Sayre	38
10	Kristopher	Collins	90
	Gregory	Compton	21
	Nanda	Siva	30
11	John	Lucas	80
	Morgan	McMinn	37
12	James	McClain	81
13	Casey	Hogg	105
15	Tony	Allen	83
	Elijah	Hedrick	5
	Elijah	Roberts	58
	Patrick	Thomas	26
16	Lacee	Emery	102
	Amanda	Smythers	73
17	Paris	Adkins	42
	Logan	Harwell	14
19	Landon	Marcum	107
20	Jessy	Blankenship	78
22	Lindsey	Harless	108

	Taylor	Maddox	69
	Caleb	Turner	96
<b>24</b>	Clara	Maynard	91
	Nancy	Peyton	95
<b>27</b>	Kevin	Akers	85
	Kristin	Brown	82
	Benjamin	Duncan	22
<b>29</b>	Matthew	Cole	11
	Aaron	Paynter	11
<b>31</b>	Chelsea	Wallen	97
<b>32</b>	Kelsey	Frank	103
	Brittan	McClain	108
	Ashton	McKinney	92
<b>34</b>	Tara	Evans	75
<b>35</b>	Austin	Clark	66
	Armin	Garmany	43
	Ramin	Garmany	52
	Samuel	Jarrell	11
	Emily	Jessee	2
	Caleb	Martin	87
	Alexandra	Mullins	35
	Chandler	Williams	77
<b>36</b>	Hannah	Barton	104
	Shakira	Bowman	98
	Kimberly	Cavender	64
	Alex	Hager	40
<b>37</b>	Thomas	Brooke	104
	Dylan	Jayasuriya	54
<b>38</b>	Hunter	Aliff	44
	Emily	McCormick	109
	Emily	McCormick	106
<b>39</b>	Morgan	Bright	63
	Kelli	Chattin	94
<b>40</b>	Hunter	White	59
<b>41</b>	Haley	Greynolds	23
	Thomas	Hughes	15
<b>42</b>	Eric	Dowdy	3
<b>43</b>	Kelsie	Krantz	68
	Jaycie	Saseen	66
<b>44</b>	Olivia	Grunau	39
	Carrie	Huffman	53
<b>45</b>	Alec	Corapinski	114
	Isaac	Johnson	86
	Catherine	O'Hearn	7

<b>46</b>	Kelly	Weaver	75
<b>48</b>	Brooke	Cottrill	100
	Sarah	Gustafson	85
	James	Jesmer	3
	Krislin	Nuzum	39
	Justin	Richter	93
	Benjamin	Wilfong	6
<b>51</b>	Pooja	Ajay Warriar	31
	Jared	Beard	77
	Zachary	Bonham	66
	David	Donaldson	20
	Hayley	Harman	33
	Matthew	Klocke	89
	Sundus	Lateef	24
	Sara	Nayeem	25
	Sarah	Peterson	55
	Garrett	Wotring	77
<b>53</b>	Chase	Chambers	49
<b>55</b>	Sarah	Liller	68
<b>59</b>	Hannah	Coffey	101
<b>60</b>	David-Michael	Buckman	16
	Jeffery	Pritt	93
<b>62</b>	Anna	Gilpin	28
<b>67</b>	Benjamin	Daily	76

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

Senate #	Participant	Poster #	
1	Savannah	Austen	29
	Cassidy	Bland	27
	Rishi	Chandrasekhar	65
	Moriah	Chicoine	99
	Moriah	Chicoine	110
	Haley	Harper	105
	Haley	Kleinedler	99
	Brian	Miller	93
	Megan	Nally	71
	Deben	Shoup	72
	Brett	Szeligo	74
Elana	Zamtori	116	
2	Pooja	Ajay Warriar	31
	Olivia	Grunau	39
	Sara	Nayeem	25

	Joseph	Richmond	15
	Janelle	Vickers	39
<b>3</b>	Kristopher	Collins	90
	Logan	Cox	67
	John	Lucas	80
	Morgan	McMinn	37
	Megan	Sayre	38
	Lindsey	Shingleton	3
	Nanda	Siva	30
<b>4</b>	Tony	Allen	83
	Elijah	Hedrick	5
	Casey	Hogg	105
	Taylor	Maddox	69
	Elijah	Roberts	58
	Patrick	Thomas	26
	Caleb	Turner	96
<b>5</b>	Paris	Adkins	42
	Lacee	Emery	102
	Amanda	Smythers	73
<b>6</b>	Kevin	Akers	85
	Kristin	Brown	82
	Benjamin	Duncan	22
	Landon	Marcum	107
<b>7</b>	Jessy	Blankenship	78
	Lindsey	Harless	108
	Clara	Maynard	91
	Nancy	Peyton	95
<b>8</b>	Hunter	Aliff	44
	Hunter	Armstead	45
	Morgan	Bright	63
	Thomas	Brooke	104
	Kelli	Chattin	94
	Austin	Clark	66
	Jacob	Douglas	4
	Armin	Garmany	43
	Emily	Jessee	2
	Emily	McCormick	109
	Emily	McCormick	106
	Lesli	Taylor	111
	Hunter	White	59
<b>9</b>	Matthew	Cole	11
	Chelsea	Wallen	97
<b>10</b>	Gregory	Compton	21
	Eric	Dowdy	3
	Kelsey	Frank	103

	Ashton	McKinney	92
	Aaron	Paynter	11
<b>11</b>	Alec	Corapinski	114
	Haley	Greynolds	23
	Carrie	Huffman	53
	Thomas	Hughes	15
	Isaac	Johnson	86
	Kelsie	Krantz	68
	Brittan	McClain	108
	Catherine	O'Hearn	7
	Jaycie	Saseen	66
<b>12</b>	Brooke	Cottrill	100
	Tara	Evans	75
	Sarah	Gustafson	85
	James	Jesmer	3
	James	McClain	81
	Krislin	Nuzum	39
	Justin	Richter	93
	Kelly	Weaver	75
	Benjamin	Wilfong	6
<b>13</b>	Jared	Beard	77
	Zachary	Bonham	66
	David	Donaldson	20
	Hayley	Harman	33
	Matthew	Klocke	89
	Sundus	Lateef	24
	Sarah	Peterson	55
	Garrett	Wotring	77
<b>14</b>	Anne	Belldina	62
	Chase	Chambers	49
	Sarah	Liller	68
<b>15</b>	David-Michael	Buckman	16
	Jeffery	Pritt	93
<b>16</b>	Hannah	Coffey	101
	Benjamin	Daily	76
	Anna	Gilpin	28
	WillEmmett	Lewis	13
<b>17</b>	Hannah	Barton	104
	Shakira	Bowman	98
	Miranda	Buckley	48
	Kimberly	Cavender	64
	Ramin	Garmany	52
	Alex	Hager	40
	Logan	Harwell	14
	Samuel	Jarrell	11

Dylan	Jayasuriya	54
Caleb	Martin	87
Alexandra	Mullins	35
Victoria	Ramey	48
Anika	Rowe	41
Chandler	Williams	77

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

State/ Country	Participant		Poster #
<b>Alabama</b>	Devyn	Gentzyel	16
<b>Argentina</b>	Matias	Gandulfo	17
<b>Arizona</b>	Mark	Magallanes	106 & 109
<b>California</b>	Leslie	Garcia	51
<b>Florida</b>	Alexa	Pigliacampi	56
	Malaika	Woody	113
<b>Illinois</b>	Ashley	Gousios	32
<b>Maryland</b>	Brianna	Busch	1
	Maria	Ganoe	50
	Christopher	King	79
	Chad	Martin	19
<b>New Jersey</b>	Robert	Eschner	13
<b>Ohio</b>	Edwina	Barnett	46
	Stacie	Baumann	85
	Brenna	Becca	60
	Brittany	Fullbright	29
	Alexis	Popa	34
	Josh	Ricket	63
	Jayson	Sykora	15
<b>Ontario</b>	Obidiah	Atkinson	115
<b>Pennsylvania</b>	Grayce	Behnke	61
	Stephen	Cavanaugh	10
	Rebecca	Davis	88
	Hannah	Lynch	50
	Jeffrey	McNeill	70
	Kelly	Slobodian	110
	Emma	Veshecco	101
<b>Spain</b>	Pablo	Puerta	17
<b>Tennessee</b>	Lauren	Griffin	36
	Jaymee	Hannan	13
<b>Virginia</b>	Steven	Blevins	9
	Cassandra	Drain	101

	Nicholas	Mireles	16
<b>Venezuala</b>	Juan Pablo	Troconis Bello	112
<b>Unspecified</b>	Lacey	Andrews	21
	Emily	Gebhardt	83
	Elizabeth	Hance	84
	Emily	Hone	31
	David	Jones	84
	Adam	Kluball	83
	Laura	Miller	18
	Christian	Pritchard	22
	Yazid	Amrani	8
	Alex	Perry	8
	Umer	Rizwan	18
	Saira	Rizwan	57
	Gaetan	Tchewa	8



#### IV. PARTICIPANTS BY FIELD (first authors only)

<b>Anthropology</b>		<b>Poster #</b>
Kristopher	Collins	90
<b>Architecture</b>		
James	Jesmer	3
<b>Astronomy &amp; Astrogeology</b>		
Alex	Hager	40
Anika	Rowe	41
<b>Biochemistry</b>		
Paris	Adkins	42
Armin	Garmany	43
<b>Biology</b>		
Hunter	Aliff	44
Hunter	Armstead	45
Savannah	Austen	29
Edwina	Barnett	46
Miranda	Buckley	48
Chase	Chambers	49
Gregory	Compton	21
Benjamin	Duncan	22
Maria	Ganoe	50
Leslie	Garcia	51
Ramin	Garmany	52
Bandana	Ghimire	47
Haley	Greynolds	23
Carrie	Huffman	53
Dylan	Jayasuriya	54
Sundus	Lateef	24
Caleb	Martin	87
Sara	Nayeem	25
Sarah	Peterson	55
Alexa	Pigliacampi	56
Saira	Rizwan	57
Elijah	Roberts	58
Patrick	Thomas	26
Hunter	White	59

## **Chemistry**

---

Brenna	Becca	60
Grayce	Behnke	61
Anne	Belldina	62
Morgan	Bright	63
Kimberly	Cavender	64
Rishi	Chandrasekhar	65
Austin	Clark	66
Logan	Cox	67
Sarah	Liller	68
Taylor	Maddox	69
Jeffrey	McNeill	70
Megan	Nally	71
Deben	Shoup	72
Amanda	Smythers	73
Brett	Szeligo	74
Kelly	Weaver	75

## **Communications/Journalism**

---

Clara	Maynard	91
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## **Computer Science/Technology**

---

Benjamin	Daily	76
Benjamin	Wilfong	6

## **Creative Arts/Graphic Design**

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Emily	Jessee	2
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## **Education**

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Alexandra	Mullins	35
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## **Engineering**

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Yazid	Amrani	8
Jared	Beard	77
Cassidy	Bland	27
Steven	Blevins	9
Stephen	Cavanaugh	10
Matthew	Cole	11
David	Donaldson	20
Jacob	Douglas	4
Robert	Eschner	13
Anna	Gilpin	28

Logan	Harwell	14
Elijah	Hedrick	5
Thomas	Hughes	15
Chad	Martin	19
Nicholas	Mireles	16
Catherine	O'Hearn	7
Pablo	Puerta	17
Umer	Rizwan	18
Zela	Wyrosdick	12

## **English**

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Ashton	McKinney	92
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## **Environmental Studies**

---

Jessy	Blankenship	78
Christopher	King	79
John	Lucas	80
James	McClain	81

## **History**

---

Lauren	Griffin	36
Morgan	McMinn	37
Megan	Sayre	38
Elena	Zambori	116

## **Immunology**

---

Savannah	Austen	29
Kristin	Brown	82

## **International Studies**

---

Brian	Miller	93
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## **Linguistics**

---

Olivia	Grunau	39
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## **Mathematics**

---

Tony	Allen	83
Sarah	Gustafson	85
Isaac	Johnson	86
Kevin	McDaniel	84

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**Medical Imaging**

---

Nanda	Siva	30
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**Music Education**

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Brianna	Busch	1
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**Neurobiology**

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Pooja	Ajay Warriar	31
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**Nutrition**

---

Ashley	Gousios	32
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**Political Science**

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Kelli	Chattin	94
Nancy	Peyton	95
Caleb	Turner	96
Chelsea	Wallen	97

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**Physics**

---

Rebecca	Davis	88
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**Psychology**

---

Hannah	Barton	104
Shakira	Bowman	98
Moriah	Chicoine	99
Brooke	Cottrill	100
Cassandra	Drain	101
Lacey	Emery	102
Kelsey	Frank	103
Hayley	Harman	33
Casey	Hogg	105
Matthew	Klocke	89
Mark	Magallanes	106
Landon	Marcum	107
Brittan	McClain	108
Emily	McCormick	109
Kelly	Slobodian	110
Lesli	Taylor	111
Juan Pablo	Troconis Bello	112
Malaika	Woody	113

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**Public Health**

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Alexis	Popa	34
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**Sociology**

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Alec	Corapinski	114
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**Sports Coaching**

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Obidiah	Atkinson	115
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**Women's Studies**

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Elana	Zambori	116
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**V. PARTICIPANTS BY BROAD CATEGORY (first authors only)**

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**Creative Arts**

---

Brianna	Busch	1
Emily	Jessee	2

---

**Engineering**

---

Yazid	Amrani	8
Steven	Blevins	9
Stephen	Cavanaugh	10
Matthew	Cole	11
David	Donaldson	20
Jacob	Douglas	4
Robert	Eschner	13
Logan	Harwell	14
Elijah	Hedrick	5
Thomas	Hughes	15
Chad	Martin	19
Nicholas	Mireles	16
Catherine	O'Hearn	7
Pablo	Puerta	17
Umer	Rizwan	18
Zela	Wyrosdick	12

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**Health Sciences**

---

Pooja	Ajay Warriar	31
Savannah	Austen	29
Cassidy	Bland	27
Gregory	Compton	21
Benjamin	Duncan	22
Anna	Gilpin	28
Ashley	Gousios	32
Haley	Greynolds	23
Hayley	Harman	33

Sundus	Lateef	24
Sara	Nayeem	25
Alexis	Popa	34
Nanda	Siva	30
Patrick	Thomas	26

### **Humanities**

---

Lauren	Griffin	36
Olivia	Grunau	39
Morgan	McMinn	37
Alexandra	Mullins	35

### **Other**

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James	Jesmer	3
Megan	Sayre	38

### **Sciences**

---

Paris	Adkins	42
Hunter	Aliff	44
Tony	Allen	83
Hunter	Armstead	45
Edwina	Barnett	46
Jared	Beard	77
Brenna	Becca	60
Grayce	Behnke	61
Anne	Belldina	62
Jessy	Blankenship	78
Morgan	Bright	63
Kristin	Brown	82
Miranda	Buckley	48
Kimberly	Cavender	64
Chase	Chambers	49
Rishi	Chandrasekhar	65
Austin	Clark	66
Logan	Cox	67
Benjamin	Daily	76
Rebecca	Davis	88
Maria	Ganoe	50
Leslie	Garcia	51
Ramin	Garmany	52
Armin	Garmany	43
Bandana	Ghimire	47
Sarah	Gustafson	85
Alex	Hager	40

Carrie	Huffman	53
Dylan	Jayasuriya	54
Isaac	Johnson	86
Christopher	King	79
Matthew	Klocke	89
Sarah	Liller	68
John	Lucas	80
Taylor	Maddox	69
Caleb	Martin	87
James	McClain	81
Kevin	McDaniel	84
Jeffrey	McNeill	70
Megan	Nally	71
Sarah	Peterson	55
Alexa	Pigliacampi	56
Saira	Rizwan	57
Elijah	Roberts	58
Anika	Rowe	41
Deben	Shoup	72
Amanda	Smythers	73
Brett	Szeligo	74
Kelly	Weaver	75
Hunter	White	59

## **Social Sciences**

---

Obidiah	Atkinson	115
Hannah	Barton	104
Shakira	Bowman	98
Kelli	Chattin	94
Moriah	Chicoine	99
Kristopher	Collins	90
Alec	Corapinski	114
Brooke	Cottrill	100
Cassandra	Drain	101
Lacee	Emery	102
Kelsey	Frank	103
Casey	Hogg	105
Mark	Magallanes	106
Landon	Marcum	107
Clara	Maynard	91
Brittan	McClain	108
Emily	McCormick	109
Ashton	McKinney	92
Brian	Miller	93
Nancy	Peyton	95

Kelly	Slobodian	110
Lesli	Taylor	111
Juan Pablo	Troconis Bello	112
Caleb	Turner	96
Chelsea	Wallen	97
Malaika	Woody	113
Elana	Zambori	116

## **Technology**

Benjamin	Wilfong	6
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## **VI. PARTICIPANTS BY INSTITUTION (first authors only)**

### **Alderson Broaddus College**

### **Poster #**

Alexa	Pigliacampi	56
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### **Bethany College**

Megan	Nally	71
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### **Bluefield State College**

Kristin	Brown	82
Chase	Chambers	49
Gregory	Compton	21
Benjamin	Duncan	22

### **Davis and Elkins College**

Sarah	Gustafson	85
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### **Fairmont State University**

Benjamin	Daily	76
James	Jesmer	3
Brian	Miller	93
Benjamin	Wilfong	6

### **Glenville State College**

Carrie	Huffman	53
Kelly	Weaver	75

### **Marshall University**

Paris	Adkins	42
Grayce	Behnke	61



Shakira	Bowman	98
Kristopher	Collins	90
Lacee	Emery	102
Armin	Garmany	43
Ramin	Garmany	52
Haley	Greynolds	23
Alex	Hager	40
Taylor	Maddox	69
Landon	Marcum	107
Clara	Maynard	91
Kevin	McDaniel	84
Nancy	Peyton	95
Deben	Shoup	72
Amanda	Smythers	73
Chelsea	Wallen	97

### **University of Charleston**

---

Hannah	Barton	104
Jessy	Blankenship	78
Kelli	Chattin	94
Logan	Cox	67
Caleb	Turner	96
Malaika	Woody	113

### **West Liberty University**

---

Moriah	Chicoine	99
Maria	Ganoe	50
Emily	Jessee	2
Caleb	Martin	87
Megan	Sayre	38
Kelly	Slobodian	110

### **West Virginia Institute of Technology**

---

Yazid	Amrani	8
Steven	Blevins	9
Matthew	Cole	11
Robert	Eschner	13
Kelsey	Frank	103
Logan	Harwell	14
Casey	Hogg	105
Thomas	Hughes	15
Mark	Magallanes	106
Brittan	McClain	108
Emily	McCormick	109

Pablo	Puerta	17
Lesli	Taylor	111

### **West Virginia State University**

---

Hunter	Aliff	44
Hunter	Armstead	45
Edwina	Barnett	46
Morgan	Bright	63
Miranda	Buckley	48
Kimberly	Cavender	64
Leslie	Garcia	51
Bandana	Ghimire	47
Dylan	Jayasuriya	54
John	Lucas	80
Umer	Rizwan	18
Saira	Rizwan	57
Elijah	Roberts	58

### **West Virginia University**

---

Pooja	Ajay Warriar	31
Tony	Allen	83
Obidiah	Atkinson	115
Savannah	Austen	29
Jared	Beard	77
Cassidy	Bland	27
Brianna	Busch	1
Stephen	Cavanaugh	10
Austin	Clark	66
Alec	Corapinski	114
Brooke	Cottrill	100
David	Donaldson	20
Jacob	Douglas	4
Cassandra	Drain	101
Anna	Gilpin	28
Ashley	Gousios	32
Lauren	Griffin	36
Olivia	Grunau	39
Hayley	Harman	33
Elijah	Hedrick	5
Christopher	King	79
Matthew	Klocke	89
Sundus	Lateef	24
Chad	Martin	19
James	McClain	81
Ashton	McKinney	92

Morgan	McMinn	37
Nicholas	Mireles	16
Alexandra	Mullins	35
Sara	Nayeem	25
Catherine	O'Hearn	7
Sarah	Peterson	55
Alexis	Popa	34
Anika	Rowe	41
Nanda	Siva	30
Patrick	Thomas	26
Hunter	White	59
Zela	Wyrosdick	12
Elana	Zambori	116

### **West Virginia Wesleyan College**

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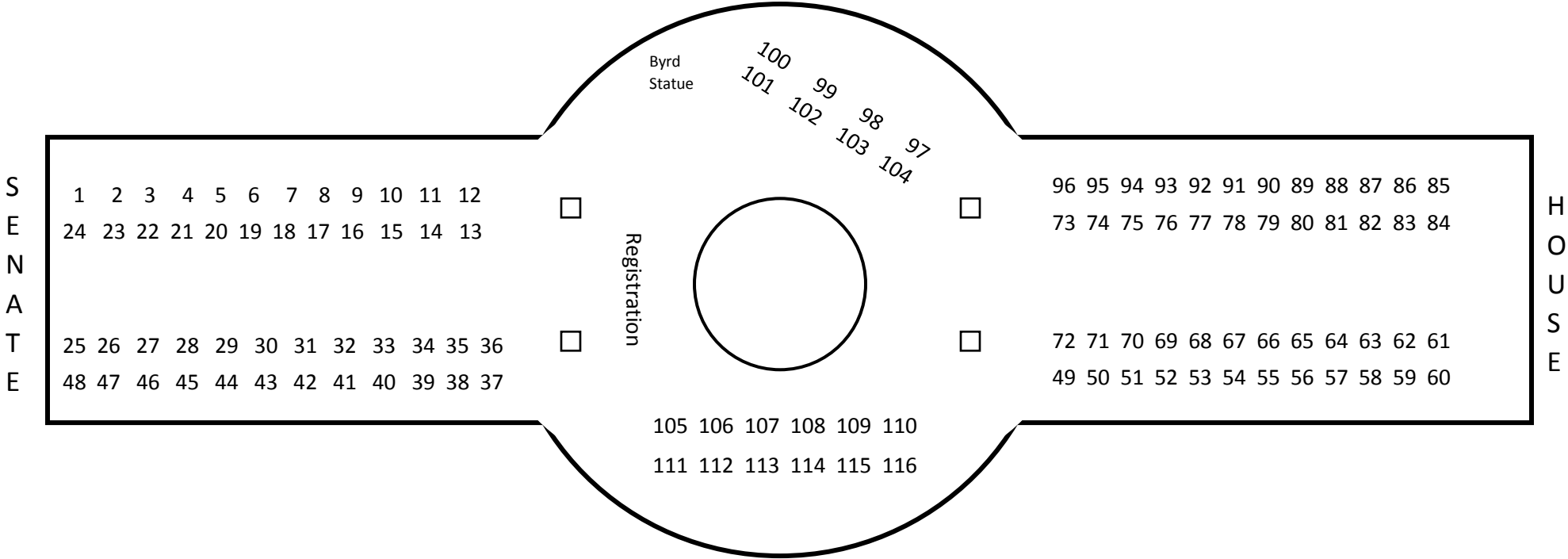
Anne	Belldina	62
Rebecca	Davis	88
Isaac	Johnson	86
Sarah	Liller	68
Jeffrey	McNeill	70

### **Wheeling Jesuit University**

---

Brenna	Becca	60
Rishi	Chandrasekhar	65
Brett	Szeligo	74
Juan Pablo	Troconis Bello	112

Capitol Rotunda Layout, 2017 Undergraduate Research Day at the Capitol



## **CREATIVE ARTS**

### **1. West Virginia Fife and Drum in Music Education**

Brianna Busch (Maryland)

Institution: West Virginia University

Field: Creative Arts (Music, Education, and History)

Faculty Advisor: George Willis

The West Virginia fife and drum tradition has become a lost musical and historical art form. My research into this art form has focused on the historical lineage of the use of fife and drum music in Colonial America and ultimately the state of West Virginia. I have studied fife and drum music in the early colonial era where the tradition was used throughout the American Revolutionary War at important sites including Lexington and Concord, Valley Forge, and Yorktown. Following the American Revolutionary War, fife and drum music was used throughout the 19th Century up through the Civil War, in both the Union and the Confederacy, including the state of West Virginia. While the fife and drum was used in the military to signal troops, following the Civil War it has basically been used to play folk music in different regions of the country. The focus of my fife and drum repertoire is mainly the folk music of the state of West Virginia including songs such as Simple Gifts, The West Virginia Hills and My Home Among the Hills. Finally, my research has been compiled into a curriculum for public school students. This curriculum combines historical events of this country and state with music that is representative of both traditional American folk music, and music that is native to the state of West Virginia.

Funding: West Virginia University College of Creative Arts and School of Music

## **2. Infographic Showcasing West Virginia to Promote Tourism**

Emily Jessee (Kanawha County, West Virginia)

Institution: West Liberty University

Field: Creative Arts (Graphic Design)

Faculty Advisor: Moonjung Kang

Infographics provide multiple ways to engage the audience, both through reading and through looking at interesting visuals, and does this better than a regular poster. Posters typically include a single, large visual and minimal information about the subject. Infographics instead include dynamic visuals such as illustrations, graphic layouts of information, interesting type treatments, and engaging supporting visual elements that are displayed in an organized, visually pleasing manner. Sections of this infographic include a brief history of W.Va., popular cuisine, wildlife information, being a mountaineer, the top 8 places to visit in the state, as well a section at the bottoms citing all information used. In an age of information overload, well organized information that is also visually stimulating gets the point across most effectively since text with visuals increases the audience willingness to read by at least 30%. Tourism is an ever growing industry in West Virginia, bringing in billions of dollars annually, and this infographic will provide a resource that can be used to promote West Virginia in a positive way and can be shown both online and in print. All of this causes the audience to share, remember, and act on the information, which ultimately leads to the audience visiting West Virginia.

Funding:

## **ENGINEERING**

### **3. Life After Coal: Taking Back The Mountain**

James Jesmer (Harrison County, West Virginia), Lindsey Shingleton (Pleasants County, West Virginia), and Eric Dowdy (Greenbrier County, West Virginia)

Institution: Fairmont State University  
Field: Engineering (Architecture)  
Faculty Advisor: Kirk Morphey

As a component of an Honors Sustainability course in Architecture, principles taught within the course were to be investigated to make a positive impact on the local ecology. The project focuses on the reclamation of, Kayford Mountain in Kayford, West Virginia; a mountain top removal site damaged by the coal industry. The presentation is separated into site analysis, site reclamation, and sustainable design implementation. The project proposes a way to turn the negative impacts of mountain top removal and surface mining, into a positive change for the community. Common afflictions on mountaintop removal sites include coal slurry ponds and the loss of habitat, topsoil, and local culture. This scenario of stripped mountaintops is all too common among the hills of Appalachia. The project seeks to make those unaffected by mountaintop removal aware of what is happening in "The Mountain State." Our proposal serves as proof that there can be life after coal.

Funding:

#### **4. Modeling, Simulation and Control of a Supercritical Coal-fired Power Plant for Smart Grid Applications**

Jacob Douglas (Putnam County, West Virginia)

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

Modern smart grid programs rely on the combustion reaction of fossil fuels such as coal to supplement energy produced by renewable resources. These programs utilize several different sources of energy. In a smart grid program, the power required from fossil fuel power plants has to change quickly in response to the available renewable energy. Therefore a fossil fuel power plant has to be able to ramp up or ramp down power generation instantaneously. A design that can be used in a smart grid program is the supercritical coal-fired power plant. If the physical properties entering the turbine cycle is kept constant as well, the power produced by the design can be cycled by changing the flow rates of the water entering the process. With this design, the power produced from the combustion reaction can be manipulated quickly to account for a change in the energy produced by renewable techniques.

In this presentation, the conditions of turbines and a boiler used in the supercritical coal-fired power plant design are manipulated by using controllers to show how this plant design could be incorporated into a smart grid program. In the control scheme for the developed power plant model, the physical properties of the steam entering the turbines are kept constant. The implemented control scheme allows for the inlet conditions of the coal and water flow rates to be cycled in order to obtain a desired power output. Preliminary results indicate that a cycling range of  $\pm 25\%$  is achievable using this design.

Funding:



## 5. Discovery of Soot Formation Pathways via Reactive Molecular Dynamics

Elijah Hedrick (Putnam County, West Virginia)

Institution: West Virginia University

Field: Engineering (Chemical Engineering/Molecular Simulations)

Faculty Advisor: Ahmed Ismail

In many modern societies, the nearly ubiquitous ownership and use of gasoline-powered automobiles has led to vast increases in pollution produced from the combustion of fossil fuels. These emissions have damaged both the environment and the health of those inhaling the toxic fumes. A primary culprit of emission-related health issues is the soot produced via the combustion of common fuels. This soot, often formed from polyaromatic compounds, has been observed to irritate tissue, and can also be a carrier for mutagenic and carcinogenic organics.<sup>4,7</sup> Because of the severity of this problem, accurate and detailed analysis of these combustion byproducts and how they are formed has become increasingly necessary. The research presented here uses molecular simulation to study these systems. On the most basic level, a fuel molecule is dispersed into a small box with excess oxygen and, given the laws of physics, progressed through time. By tracking the positions of the molecules, knowing normal bond lengths, and thermodynamic data, the pathway that the reaction takes from one aromatic compound to a polyaromatic soot can be traced. Here, different temperatures and ratios of oxygen to fuel are tested in order to best understand the conditions under which these soots form, and also to derive reaction rate laws and rate parameters.

Funding:

## 6. Solar Energy Storage: Uncovering the Right Stuff for the Job

Benjamin Wilfong (Harrison County, West Virginia)

Institution: Fairmont State University

Field: Engineering (Computer Sciences)

Faculty Advisor: Thomas Devine

One of the biggest problems with solar energy is storage. When the sun is bright and shining, we can obtain loads of power. However, in order to completely rely on solar, we must still have power when it's dark out or the weather is cloudy. The Solar Army project at Fairmont State University is currently working to find mixtures of cheap and easily obtainable metal oxides that yield the highest energy output when exposed to light. The idea is to find the most effective composition of elements that can be used for solar energy storage, while still being affordable and available. There are currently thirty-six elements that we are combining and testing. Although we have collected lots of data, it is difficult to draw conclusions just by looking at grids of decimal numbers. My hope is to employ data mining to find hidden information in these readings we are obtaining. Which elements give us the best results? Are there large spikes for some combinations? How do they compare against others? There are an unfathomable amount of combinations that can be tested using just 36 elements, 68,719,476,735 or  $(2^{36}) - 1$  to be exact. Comparing even a fraction of these combinations to each other would be extremely time consuming for a human- impossible even. However, for a computer or a cluster of computers, drawing conclusions from our results may not be so far-fetched. We hope to use this advantage to navigate our way through the seemingly endless number of possibilities.

Funding:

## **7. Light Extraction Efficiency Enhancement of III-V Nitride Based LEDs through Periodic Plasmonic Structures**

Catherine O'Hearn (Upshur County, West Virginia)

Institution: West Virginia University

Field: Engineering (Electrical Engineering)

Faculty Advisor: Jeremy Dawson

III-V nitride-based LEDs are more radiation resistant than their silicon counterparts, therefore potentially requiring less shielding and producing lighter, more efficient launch vehicles for space exploration. The addition of periodic plasmonic structures to the LEDs would be the sensible next step in our group's research goals of increasing LED operating efficiency. Most LEDs attempt to improve light extraction efficiency by locating photonic crystals on the outer layer of the LED. However, this has shown to hinder the electrical characteristics of the device. By including a nanoperiodic metal plasmonic lattice on the surface of the LED, it is believed that spontaneous emission and light extraction could be enhanced through electric field resonance (higher energy of photon emission) and the Purcell effect (more photons per unit time), thus increasing the external quantum efficiency,  $\eta_{\text{ext}}$ . It has been shown that plasmonic nanostructures can greatly increase the extraction efficiency of blue LEDs. However, this structure has not been modeled nor tested, and would could assist in understanding how to maximize LED efficiency. Our group has experienced success in plasmonic enhancement for biosensor applications, and has experience in LED fabrication.

Funding:

## **8. Solar-Wind Hybrid Outdoor Lighting System**

Yazid Amrani, Gaetan Tchewa, and Alex Perry

Institution: West Virginia Institute of Technology

Field: Engineering

Faculty Advisor: Farshid Zabihian

This project addresses one of the major issues in the power engineering industry. Power generation and distribution companies are often put in situations in which it is not possible for the power plant to take down a unit for mandatory maintenance since it could pose a risk to the ability to match the demand by the power grid. The proposed capstone project will remove a large load from the power grid through the use of a hybrid outdoor lighting system. The prototype will optimize power output by utilizing a Vertical Axis Wind Turbine (VAWT) and a photovoltaic solar panel that will provide necessary energy for a LED light bulb. The choice of exploiting wind energy and solar energy is counteractive since wind energy is available at days where solar energy is missing. An IES type II Lighting distribution will be used to meet the minimum illuminance and luminosity that is set by the National Department of Transportation. The prototype will also use an Arduino programmed dual-axis solar tracker that is expected to increase the solar panel's electricity output by more than 25%. Undergoing research will determine the specific type of battery, controller, stepper or servo motors, and lighting that will be integrated in the system. This lighting system will also provide electricity to remote areas in certain third world countries where they electricity is not available due to the lack of transmission lines in those areas.

Funding:

## **9. Developing an Integrated Electro-Mechanical Energy Conversion System**

Steven Blevins (Virginia)

Institution: West Virginia Institute of Technology

Field: Engineering

Faculty Advisor: Kenan Hatipoglu

The main objective of this research project is to develop an integrated electro-mechanical energy conversion system at West Virginia University Institute of Technology (WVU Tech). The proposed system is capable of demonstrating more than 50 realistic motor and generator configurations of both AC and DC types. It will allow future and current students to assemble a motor or generator from various available parts, optimize the configuration of the certain motor or generator, and control and measure its performance in real time. The proposed electro-mechanical system will be used primarily to support the undergraduate curricula of three departments at WVU Tech. These three departments are as follows: the Electrical and Computer Engineering Department, the Mechanical Engineering Department, and the Computer Science Department. Thanks to the inter-disciplinary nature of the project, this project would establish an excellent platform for collaborative efforts among faculties and students from the three departments at WVU Tech listed above.

Funding: WVHEPC

## **10. Modeling Vibrio in Estuarine Environment: Remote Sensing and in-situ Implications**

Stephen Cavanaugh (Pennsylvania)

Institution: West Virginia University

Field: Engineering

Faculty Advisor: Antar Jutla

Remote sensing and satellites have long been used to accumulate data on Earth with the implications of this data allowing us to query how diseases are triggered by environmental factors. Our study primarily focuses on the predictability of water borne diseases through understanding of environmental factors through use of satellite derived large data sets. Our study looks into growth of pathogens (e.g. vibrio) in marine environment. Many of the species of bacteria are capable of thriving in oysters - a major source of food, in water, and in sediment. This species of bacteria, *Vibrio*, and its various subspecies, can cause many different types of diseases, including gastroenteritis, skin lesions, and cholera. Due to these potential hazards, being able to predict potential outbreaks of disease is an important endeavor. Notably, satellite data can be used to predict the growth and potential outbreak locations of the bacteria and related diseases in both populated and remote areas of the world without the need for direct enumeration of bacteria.

Funding: NASA

## **11. Portable Modular Interlocking Water Barrier for Flood Damage Mitigation**

Matthew Cole (Raleigh County, West Virginia), Samuel Jarrell (Kanawha County, West Virginia), and Aaron Paynter (Monroe County, West Virginia)

Institution: West Virginia Institute of Technology  
Field: Engineering  
Faculty Advisor: Farshid Zabihian

The purpose of this project is to create a portable water control device. Flooding in the US causes billions of dollars of damage each year. The summer 2016 flooding that occurred in West Virginia caused significant damage to homes and businesses. The goal of this project was to improve on existing technologies to help mitigate some of this damage while being easier to set up for the end user. Various forms of flood prevention methods are available, but many are unaffordable by most or too bulky to deploy quickly by a small number of people without the use of equipment. While developing the conceptual design, numerous factors such as material type, durability, cost and customer requirements were considered. Decision matrices were used to choose among various competing options. We conducted a survey of flood victims to help us define our problem and identify customer needs. This data was utilized to help us determine how we should design the unit. For example, the survey highlighted the need for the product to be quickly deployable. The length of one module of our product is based on human factors. At the end of the products life, many of the components will be recyclable further adding to the overall sustainability of the product. We have addressed many of the problems in current technologies by creating a water control device that is modular, portable, relatively lightweight, and inexpensive.

Funding: Chapman Technical Group, Individual Donations

## **12. Energy Efficiency Recommendations for Morgantown City Buildings**

Zela Wyrosdick (in place of Alexandra Davis)

Institution: West Virginia University

Field: Engineering

Faculty Advisor: Bhaskaran Gopalakrishnan

The research focused on determining ways to save energy in Morgantown municipal buildings. Several buildings were visited and measurements were taken in regard to light levels, temperature, and air flow, observations were also made on various energy intensive equipment in the buildings. The utility bills were gathered and analyzed, and in some cases the amount of energy usage was deduced based on the building characteristics using DOE standards. Engineering principles were used in calculating energy savings with respect to lighting, heating, ventilation, air conditioning systems, hot water systems, and the building envelope. The proposed recommendations amounted to energy savings of 139,656 kWh/year in electricity, 504+ MMBtu per year of natural gas, cost savings of \$32,755 per year and 329,250+ lbs of CO<sub>2</sub> in emissions reduction. The recommended energy savings were 21% of the total energy use of all buildings. The results were presented to city buildings personnel as well as to the city council and received a favorable response. This research has the potential to impact the community directly associated with Morgantown, WV as well as serve as a role model for other municipalities in the state.

Funding: Industrial Assessment Center



### **13. Design of an Automotive Hydrogen Generator**

Robert Eschner (New Jersey), Jaymee Hannan (Tennessee), and WillEmmett Lewis (Jefferson County, West Virginia)

Institution: West Virginia Institute of Technology

Field: Engineering

Faculty Advisor: Farshid Zabihian

The objective of this project was to design a cost effective, efficient, on-board hydrogen generator for an automotive engine. Hydrogen can be produced using electrolysis, a process where electricity is run through metal electrodes submerged in a water-electrolyte solution, thus breaking apart the water into hydrogen and oxygen. The produced hydrogen is then pumped into the engine in order to replace part of the gasoline being used. Many factors were considered in the design process including: size, reparability, ease of installation, durability, and safety. Baking Soda, or sodium bicarbonate, is the electrolyte that was chosen for our purpose. The byproducts of the electrolysis process with sodium bicarbonate are: Carbon dioxide (CO<sub>2</sub>), Hydrogen (H<sub>2</sub>), Oxygen (O<sub>2</sub>) and Nitrogen (N<sub>2</sub>), all of which is found naturally in the atmosphere. Deciding on an electrode was a much more complicated decision. We performed extensive research to find an electrode that is cost effective, sustainable, easily accessible and manufactured, and has good resistivity. The generator will be powered using the car's pre-existing battery by running wires to the car's fuse box and connecting them into an open fuse port. The fuse connection that will be used is active when the engine is running and off when the engine is turned off, similar to how a car's radio can't be used unless the car is turned on. The project was broken down into the following sections: hydrogen research, determining system size, calculations to determine hydrogen necessary to meet our goal, material selection, and system design.

Funding:

#### **14. Proactive Surrogate Traffic Safety Analysis for Signalized Intersections in West Virginia**

Logan Harwell (Kanawha County, West Virginia)

Institution: West Virginia Institute of Technology

Field: Engineering

Faculty Advisor: Amr Mohammed

A number of key signalized intersections in Charleston, WV were carefully selected to study different safety causes and factors. This was completed by means of a state-of-the-art video camera recorder, which aimed to collect traffic and crash data. This study aimed to use the method of Surrogate safety measures to assess the traffic safety along these intersections. First, traffic volumes were captured on all approaches for these intersections for both peak and off-peak hours. They then aimed to capture several surrogate measures of crash occurrence using the same video camera footage. The researchers have found that, in general, traffic intersections in Charleston are considered safe, as most drivers adhere to traffic rules and intersections were designed with high safety standards. However, a few changes could be suggested for the layout and signal design to add to the traffic safety across intersections in West Virginia as to improve upon the lives of those that live there.

Funding:

## **15. Baja Buggy Frame Design for Improved Maneuverability and Weight Reduction**

Thomas Hughes (Nicholas County, West Virginia), Jayson Sykora (Ohio County, West Virginia), and Joseph Richmond (Marshall County, West Virginia)

Institution: West Virginia Institute of Technology

Field: Engineering

Faculty Advisor: Farshid Zabihian

Our team consists of three highly qualified mechanical engineers that have successfully redesigned the frame for the SAE BAJA Buggy. We have integrated three decision-making tools from the book: Engineering Design by George E. Dieter and Linda C. Schmidt into our design process. We have currently developed a solid frame within SolidWorks to model the frame we will build in the future. We are currently working on a finite element analysis of the SolidWorks frame to simulate real world situations that would occur during a Baja event. These situations include side impact, front impact, rear impact, and a roll over situation. When we analyzed the data from the testing, we determined what we needed to improve, strengthen, or even remove to properly reduce the weight and improve maneuverability on the buggy. The team will improve the maneuverability and significantly reduced the overall weight of the frame by efficiently utilizing materials. These materials we determined to be tubes of 4130 steel at 1-inch diameter and a wall thickness of 0.065-inches. The final evaluation of the frame redesign, new center of gravity, new weight distribution, and weight reduction is on the day of the SAE BAJA Buggy competition in the spring of 2017. This competition is where we can see how our buggy rates compared to other schools. Our goal was to systematically engineer a frame that will be sustainable in order to optimize the buggy in the coming years.

Funding: SAE Baja

## **16. Mountaineer Mercury Rover**

Nicholas Mireles (Virginia), David-Michael Buckman (Berkeley County, West Virginia), and Devyn Gentzyl (Alabama)

Institution: West Virginia University

Field: Engineering

Faculty Advisor: Powsiri Klinkhachorn

The Mercury Remote Robot Challenge is an international, interscholastic competition for robotics. The challenge is to design and build a robot capable of completing a remote mission. The operator and robot must be located at least 50 miles (80 Km) apart. The mission includes navigation of a dark tunnel, capturing a lag bolt payload, climbing and descending 30° inclines, navigating a slalom, and delicately placing the payload within a small area. In addition to these actions, the robot must also demonstrate its speed in a sprint towards the finish line as well as pass a Loss of Signal (LOS) test. Our design incorporates new design challenges and technologies for the students involved. This includes an electro-permanent magnet, as well as an Inertial Measurement Unit. The electro-permanent magnet has only recently become commercially available and, unlike a typical electromagnet, only requires a quick application of electrical current to magnetize itself. The ability to toggle the magnetism versus actively maintaining it allows a great amount of power savings. The Inertial Measurement Unit allows measurement of acceleration along six degrees of freedom as well as magnetic field strength. Other technologies being incorporated into the design include image processing and NHTSA Level 2 autonomy. Image processing will be implemented to help with the detection of the payload. Semiautonomy will be implemented to assist with navigation during periods of great network latency and will use be implemented with the aid of time-of-flight sensors as well as a wall tracking algorithm.

Funding: NASA West Virginia Space Grant Consortium

## 17. Analysis of Small Scale Renewable Sources and Comparison with Real Applications

Pablo Puerta (Spain) and Matias Gandulfo (Argentina)

Institution: West Virginia Institute of Technology

Field: Engineering

Faculty Advisor: Farshid Zabihian

The overall objective of this project is to determine a suitable configuration for a wind turbine, a solar cell and a fuel cell in order to obtain the highest efficiency possible while producing and storing energy at the school ambient conditions. To achieve this, the team intends to understand how every parameter changes the overall output by performing experiments on small scale units. To understand how changing every parameter affected the output, the team performed experiments changing one variable and have voltage and current measurements. After that, results were graphed and compared with real life outputs by the corresponding system. Literature review was performed in order to find whether or not the results found could be compared with real life applications. For the wind turbine case, the team found out why a higher pitch angle benefits performance with low wind speeds while a smaller pitch angle works better with higher speeds. Also, even though the small scaled experiments observed an increase in efficiency by augmenting the number of blades, the team proved why the three blade turbine is the most cost-benefits efficient and therefore the most used in the market. Regarding the fuel cell, the team observed that a higher pressure and a higher temperature at operating conditions using a Polymer Electrolyte Membrane (PEM) improve the efficiency of the fuel cell. Nevertheless, the ability to increase these variables is application-dependent, because system issues, weight and cost play important factors when optimizing certain parameters.

Funding:

## **18. WVSU Participation in NASA Space Flight Design Challenge**

Umer Rizwan, Saira Rizwan, and Laura Miller

Institution: West Virginia State University

Field: Engineering

Faculty Advisor: Marek Krasnansky

NASA IV&V's Space Flight Design Challenge (SFDC) in collaboration with the Colorado Space Grant Consortium RockSat-C program allows student in STEM disciplines to build space experiments and systems for suborbital flight. Teams of college students build their own scientific experiments which are launched on a sounding rocket past the Karman line from NASA's Wallops Flight Facility (WFF). WVSU took part in the 2016 RockSat-C program alongside nine other West Virginian higher education institutions. The WVSU SFDC team designed, built, and tested a space payload to measure radiation, acceleration, angular velocity, magnetic fields, temperature and pressure using off-the-shelf electronics. On June 24 at 6:06 a.m. EDT NASA launched the 2016 RockSat-C payload experiments on a Terrier-Improved Orion sounding rocket from NASA WFF in Virginia. The payload reached apogee at 119 km before parachuting into the Atlantic Ocean. The payload experiments were recovered and student teams analyzed the acquired data. The WVSU payload successfully collected data from all sensors of over three hours for the entire flight. The results indicate acceleration, angular velocity and magnetic field can help in reconstructing flight paths, while the radiation data show radiation levels at different sub-orbital altitudes and can help advance radiation tolerant technology, such as Field Programmable Gate Arrays (FPGAs) and manned flights.

Funding: NASA Independent Verification and Validation (IV&V) Facility

## **19. Liberation by Fine Grinding in Mineral Processing**

Chad Martin (Maryland)

Institution: West Virginia University

Field: Engineering (Mining Engineering)

Faculty Advisor: Aaron Noble

The purpose of mineral processing is to concentrate desirable minerals and remove undesirable waste from mined material. This process allows the mined product to become enriched to a degree that permits downstream sale to other markets. The first step in this process is physical liberation of the desired mineral from the host rock. Liberation is often achieved by crushing and grinding the material to a sufficiently small size. Current research at West Virginia University is assessing the particle size reduction needed to effectively liberate coal waste from potentially valuable trace elements, such as the rare earth elements. Given the extremely fine size of these trace elements, extensive grinding is needed to reduce the coal to the ultra-fine liberation sizes, often below 10 microns. Laboratory tests on several Central Appalachian coals have been used to quantify the energy and cost required for fine grinding. Data from these tests can be used to model larger scale operations and determine if downstream byproduct recovery operations are feasible. If successful, this project could provide a large boost to the bottom lines of coal companies across America and especially West Virginia. Additional revenue from rare earth elements could counteract the rising regulatory and operating costs in today's coal mines.

Funding: Department of Energy, National Energy Technology Laboratory

## **20. An Innovative Approach to Solving Traffic Congestion at Morgantown's Busiest Crossroads: The Mountainlair**

David Donaldson (Monongalia County, West Virginia)

Institution: West Virginia University

Field: Engineering (Transportation Engineering)

Faculty Advisor: David Martinelli

Too much street regulation creates the misconception that the roads are relatively safe and lead drivers to believe they have no obligation to look out for other users. Consequently, this can cause motorists as well as pedestrians and cyclists to reduce their awareness for each other and proceed without caution. A possible solution, employ shared space in cities and towns to help minimize the unsafe behavioral disconnect between the public realm and vehicle traffic. Shared space is an urban design concept that seeks to give pedestrian, cyclist and vehicular traffic equal right-of-way by significantly limiting the number of traffic signals, curbs, traditional pavement markings and signage. This counter-intuitive, yet successful European model actually improves the safety of all road users since the uncertainty of whom has the right of way forces drivers to slow down and better process the surrounding environment. This makes the use of eye contact and hand motions essential when traversing a shared space. This research looked at whether shared space could accommodate a section of road with a high volume of traffic and pedestrians in front of the Mountainlair on WVU's downtown campus. Many previous studies had established the benefits of safety and street beautification associated with shared space; however, there was little to no prior research to indicate that traffic congestion could be reduced as well. Thus, the goal was to determine whether shared space could be modeled to effectively decrease vehicle travel times and delays.

Funding:



## HEALTH SCIENCES

### 21. Ultrastructure of Zebrafish Enterocytes during Lipid Absorption

Gregory Compton (Monroe County, West Virginia) and Lacey Andrews

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

The American diet consists of dietary fats and cholesterol that contribute to obesity, diabetes, and dyslipidemias. The mechanism behind the uptake of these dietary fats and cholesterol into enterocytes, intestinal absorptive cells are still widely unknown. The purpose of this study is to elucidate the dynamic interaction of lipid droplets and mitochondria during lipid absorption in these cells. Prior studies have shown that larvae fed a high fat diet undergo lipid droplet biogenesis. As lipid droplets increase in size, mitochondria appear to associate to this newly formed organelle. Our preliminary data show that the overall number of mitochondria in the cell during lipid absorption decreased while the average size of the mitochondria increased. This supports the hypothesis that the decreasing number and increase in overall size of mitochondria is directly associated with fusion of smaller mitochondria. To further test the dynamic nature of the lipid droplet and mitochondria interactions, increasing concentrations of oleic acid will be fed to zebrafish larvae. The fed zebrafish larvae will be fixed in an Epon mold and cut into sections using an ultra-microtome. Sections from the anterior intestine will be imaged using transmission electron microscopy. Lipid droplet and mitochondrial dynamics will be quantified using NIH ImageJ. Better understanding the cell biology of cholesterol absorption will translate into discovery of new medications to aid in the safe treatment of dyslipidemias.

Funding: WV-INBRE

## 22. Construction of a NPC1L1 <sup>-/-</sup> Zebrafish Larvae Line to Study Cholesterol Absorption

Benjamin Duncan (Mercer County, West Virginia) and Christian Pritchard

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

How the intestinal absorption of lipids impact dyslipidemias such as obesity and diabetes is currently under debate. NPC1L1 is a critical transport protein in enterocyte cholesterol absorption. To understand the mechanism of intestinal NPC1L1 uptake within the enterocyte, we are making a npc1l1 <sup>-/-</sup> (gene knockout) line in zebrafish. We hypothesize that the npc1l1 <sup>-/-</sup> larval zebrafish will show reduced intestinal cholesterol absorption when challenged to a high fat diet compared to wild type larvae. To do this, we have used a gene editing tool known as CRISPR to create genomic mutations within the NPC1L1 sequence. The CRISPR system will create a frameshift mutation within the reading frame leading to a premature stop codon. The crRNA:tracrRNA complex was assembled and Cas9 mRNA was amplified. The crRNA:tracrRNA complex and the Cas9 mRNA was injected into single cell zebrafish embryos. After injection, the custom constructed crRNA:tracrRNA complex and the newly made Cas9 protein combined to form the CRISPR complex. The CRISPR complex will create double stranded breaks where frame shift mutations were created by non-homologous end joining (NHEJ) repair. We hypothesize some of the mutations will result in premature stop codons disrupting the translation of the protein. After raising injected embryos, we will screen for frame shifts by genomic sequencing to identify mutations where we will then raise a npc1l1 <sup>-/-</sup> line. Future experiments will introduce a fluorescently labeled NPC1L1 protein that will enable us to track the location and monitor the activity of NPC1L1 within the enterocyte during dietary lipid uptake.

Funding: WV-INBRE

### **23. A New Approach for the Therapy of Parkinson's Disease and other Neurological Disorders**

Haley Greynolds (Nicholas County, West Virginia)

Institution: Marshall University

Field: Health Sciences (Biology)

Faculty Advisor: Elmer Price

Individuals who suffer from neurodegenerative diseases (e.g., Parkinson's) or brain injuries (e.g., stroke) have few treatment options. Many laboratories have attempted to treat these disorders with stem cell transplants but numerous problems have been associated with this method. Our laboratory is taking a very different approach, using the adult brain's own preexisting neural stem cells as a source of therapeutic cells. Typically, neural stem cells are produced within the subventricular zone in the adult mammalian brain and these cells travel along a migratory path called the rostral migratory stream in order to reach the olfactory bulb. Our research involves the implantation of a small cylindrical gel-like matrix into the brain. These cylinders consist of biologically-compatible materials and are engineered to contain various biologically active molecules. The cylinders are 6 mm long and 0.7 mm wide and are surgically implanted into rat brains. Neural stem cells that normally travel down the rostral migratory stream to the olfactory bulb begin to travel down the track of the implant to a destination other than the olfactory bulb. In this fashion, we are able to deliberately guide new neurons into specific regions of the brain that have lost functional neurons due to injury or disease. Thus, the implant creates a new migratory path that leads new neural cells into regions of the brain that need new neurons due damage or disease.

Funding: National Science Foundation

## **24. High Fructose Corn Syrup-55 Promotes Triglyceride Accumulation and Alters Fat Metabolism in the Liver**

Sundus Lateef (Monongalia County, West Virginia)

Institution: West Virginia University

Field: Health Sciences (Biology)

Faculty Advisor: Janet Tou

High fructose intake promotes metabolic dysfunction, particularly de novo lipogenesis (DNL), a condition in which increased lipid (fat) synthesis is not compensated by increased lipid breakdown. DNL promotes non-alcoholic fatty liver disease (NAFLD). NAFLD often progresses to cirrhosis and liver failure and affects more than 28 million adults in the United States. High fructose corn syrup-55 has replaced sucrose (table sugar) as a caloric sweetener in various processed foods. This study investigated whether the slightly higher fructose content in high fructose corn syrup-55 (HFCS-55; 55% free fructose) is more lipogenic than sucrose (50% fructose in disaccharide form). Healthy growing rats were assigned to one of four treatment groups consisting of either 1) water or water sweetened with 2) sucrose, 3) fructose or 4) HFCS-55 for 8 weeks. Caloric sweeteners were administered at a concentration of 13% weight/volume, the level typically found in sugar-sweetened beverages. There was no significant difference in caloric intake between rats drinking HFCS-55 and sucrose-sweetened beverages. Rats drinking HFCS-55 had the most extensive evidence of fatty deposits in the liver of any treatment group. Molecular genetic analysis of liver tissues showed enzymes activating DNL were higher and liver lipid output was lower in the HFCS-55 treatment group compared to the sucrose group. Blood triglyceride and low-density lipoprotein levels were higher in rats drinking HFCS-55 compared to water, but not in sucrose versus water. The study results indicate that healthy growing rats were at a greater risk of developing NAFLD due to HFCS-55 consumption compared to sucrose consumption.

Funding: WVU SURE, WVU PSCOR and Agricultural, Forestry Experimental Station Hatch Grant H45 and the West Virginia Research Challenge Fund through a grant from the Davis College of Agriculture, West Virginia University

## **25. Brain Trauma and MicroRNAs**

Sara Nayeem (Monongalia County)

Institution: West Virginia University

Field: Health Sciences (Biology)

Faculty Advisors: Elizabeth Engler-Chiurazzi and James Simpkins

Traumatic injury is a global social, economic, and public health burden. Trauma affecting the brain is particularly problematic due to resulting morbidity and long-lasting secondary injuries. Importantly, West Virginia historically has a brain trauma-related death rate approximately 15% higher than the national average. Further, traumatic injuries significantly impact the state's relatively large elderly (15.8%) and veteran (9%) populations, groups particularly vulnerable to such injuries. To develop novel interventions to ameliorate the detrimental brain-related consequences of trauma, we investigated the role of microRNAs (miRNAs). MiRNAs are small non-coding RNAs that regulate protein translation, usually causing reduced protein levels. Findings suggest that clinical outcome varies with circulating miRNA levels post-trauma. To characterize circulating miRNA changes following trauma, we assayed blood samples of traumatic brain injury and hemorrhagic shock patients at various times after the acute injury (1-140 hours). The miRNAs evaluated regulate neurological activity, mitochondrial function, inflammation, and synaptic plasticity in the brain. If miRNAs are important markers for traumatic injury progression, then circulating levels should change depending on injury type, time-point, and miRNA target. We found elevated miRNA levels within 2-3 hours post-injury; within 8 hours miRNAs then gradually declined to the lowest observed levels. These data identify a critical time window immediately post-injury in which trauma-induced miRNA changes occur. We hope our findings can 1) contribute to our understanding of how trauma-related secondary injury impairs brain function and 2) reveal targets for novel resuscitative agents that could improve patient survival and recovery for West Virginians and patients worldwide.

**Funding:** National Institutes of Health

## 26. Leukemia in the Bone Marrow Microenvironment

Patrick Thomas (Putnam County)

Institution: West Virginia University

Field: Health Sciences (Biology)

Faculty Advisor: Laura Gibson

Leukemia initiates in the marrow and it is often the site where aggressive disease recurs following completion of treatment. This work explores how the bone marrow microenvironment modulates the metabolism of ALL cells. Using a model including co-culture of ALL tumor cells with stromal components of the bone marrow, we observed three sub populations of ALL cells. Of the sub populations, the "phase dim" (PD) tumor cells that bury under the adherent stromal cells are uniquely resistant to chemotherapy. To characterize PD tumor cells we identified variations in their metabolic pathways that control macromolecule synthesis and proliferation. Changes in the active form of both protein kinase B (AKT) and AMP-activated protein kinase (AMPK), key metabolic regulators that control protein synthesis and lipid metabolism respectively, were observed. In addition, PD cells have a higher rate of glycolysis than cells grown in media alone. Along with providing ATP, glycolysis has the ability to produce intermediates for macromolecule synthesis, a critical step for cells poised to proliferate. We hypothesize this increase in metabolic activity contributes to the survival and quiescence of the PD population. Changes in the metabolism of the resilient population found in the bone marrow provide novel targets for treatments aimed at sensitizing these resistant tumors with the hope of reducing minimal residual disease and relapse. Better understanding the unique characteristics of the PD tumor cells that survive chemotherapy may help identify strategies to target this resistant population to improve patient outcomes and reduce the risk of relapse.

Funding: NIH

## **27. Identifying Differential Gene Expression in Cytotoxic T Cells Induced by B16F0 Melanoma Exosomes**

Cassidy Bland (Brooke County, West Virginia)

Institution: West Virginia University

Field: Health Sciences (Engineering)

Faculty Advisor: David Klinke

Recent clinical studies demonstrate how engaging a patient's own immune system can be an effective tool in the fight against cancer. Yet, a barrier for broadening the clinical benefit of immunotherapy is identifying how tumors suppress the ability of immune cells to kill malignant cells. An important emerging mode for cellular cross talk is exosomes, which are nanoscaled particles secreted by tumors that carry proteins and RNA. To better understand how tumor-derived exosomes can alter immune cell function, this study investigated the effects of tumor exosomes on cytotoxic T cells. Specifically, we quantified how exosomes from B16F0 mouse melanoma cells altered gene expression over time within CTLL2 cells, a mouse cytotoxic T cell line. Changes in mRNA over time were analyzed by RNA sequencing and differential gene expression was determined using R, a statistics software tool. Pathway enrichment algorithms were used to identify how B16F0-derived exosomes alter the function of cytotoxic T cells.

Funding: WVU Cancer Institute

## **28. Harnessing In Vivo Biochemical and Biomechanical Cues for Stem Cell Biomanufacturing**

Anna Gilpin (Berkeley County, West Virginia)

Institution: West Virginia University

Field: Health Sciences (Engineering)

Faculty Advisor: Yong Yang

As the demand for stem cell products continues to rise, the need for advanced biomanufacturing techniques has become increasingly apparent. Conventional stem cell culture on 2-D, stiff substrates tends to limit cell number and impair cells' regenerative capacity, making culture environments that mimic in vivo conditions desired. Two aspects include biochemical and biomechanical cues, which both arise from the cells' extracellular matrix (ECM). The ECM is isolated as an in vitro substrate through decellularization, in which native cells are removed to retain important biomacromolecules. Current techniques employ surfactants that can destroy the ECM's inherent features. Therefore, we are developing a non-damaging method of decellularization using supercritical carbon dioxide (scCO<sub>2</sub>) to isolate the ECM for stem cell culture. Parameters like scCO<sub>2</sub> pressure, treatment time, and low surfactant concentration addition have been investigated using human dermal fibroblast (hDF) cell sheets. It was found that scCO<sub>2</sub> treatment at 15 MPa for 30 minutes with 0.05% Triton X-100 (surfactant) was the most effective. Once an optimal procedure is achieved, we will combine the decellularized ECM with hydrogels of tunable stiffness to serve as substrates for human mesenchymal stem cells (hMSCs) via microspheres. These microspheres will then be cultured in a microgravity-simulating bioreactor, in order to create a low-stress environment. It is expected that the stem cells will have an increased cell yield and maintain their stemness better than traditional culture substrates. This methodology can then be applied to other cell types and scaled up for mass production of stem cell products.

Funding: NASA WV Space Grant Consortium



## **29. Commensal Microbiota in the Intestine Influence Immunity to a Vaccine**

Savannah Austen (Ohio County, West Virginia) and Brittany Fulbright (Ohio County, West Virginia)

Institution: West Virginia University

Field: Health Sciences (Immunology)

Faculty Advisor: Rosana Schafer

In recent years, there has been an explosion of research demonstrating the role of the normal gut microbiome in both maintenance of health and potentially contributing to diseases including diabetes, cardiovascular disease, and obesity. Previously, it was demonstrated that the immune response to a *Streptococcus pneumoniae* vaccine is enhanced by exposure to a commonly used pesticide, propanil. To investigate the role of the gut microbiome in the propanil-mediated enhancement of the immune response to the vaccine, C57Bl/6 female mice were administered a cocktail of antibiotics (vancomycin, ampicillin, metronidazole, and neomycin) in their drinking water for 10 days to eliminate intestinal bacteria. Fecal samples were collected daily. Staining, bacterial cell counts and viability assays were performed to determine the types and amounts of live bacterial cells present in each fecal sample. On day 3, mice were immunized with the vaccine and propanil. On day 10, the immune response was determined by measuring the amount of antibody produced in the spleens of vaccinated animals. Alteration of the intestinal bacteria population by antibiotics resulted in a dramatic and significant increase in the number of antibody-producing cells in the spleen of propanil-exposed mice after vaccination. These results suggest that the normal intestinal bacteria may play a role in regulation of the immune response. A loss or disruption in gut microbiome may potentially contribute to inflammation or autoimmune diseases.

Funding:

### **30. Low-dose Wearable PET imaging during Ambulatory Motion in Humans**

Nanda Siva (Wood County, West Virginia)

Institution: West Virginia University

Field: Health Sciences (Medical Imaging)

Faculty Advisor: Julie Brefczynski-Lewis

A major goal in neuroscience is to understand how the human brain behaves during everyday situations. However, current imaging modalities such as MRI and EEG are ineffective at providing representations of deep brain structures during motion. This limitation is significant as subcortical grey matter plays an important role in movement, emotion, and other functions in everyday life. Our group has developed a wearable Positron Emission Tomography (PET) brain scanner that is co-registered with the human head during movement and measures metabolic activity levels in different brain regions. The imager consists of 12 modules of silicon photomultipliers in a lightweight 21 cm ring, which only requires a low dose of at most 10% of the typical clinically-injected dose of F18-FDG (glucose-analog). The current study is the first upright human brain imaging study with ambulatory motion, in which patients are asked to perform simple physical tasks, such as walking in place or tapping their foot. The images produced will be compared with clinical PET scans of the same participants to determine the quality of the scanner; additionally, analysis of dynamic PET data will be performed to track glucose uptake over time. Future investigation will involve testing the imager on subjects participating in natural social interactions. The use of this scanner can be extended to various research endeavors, such as monitoring therapeutic response and associated brain plasticity for patients during stroke recovery, or for diagnosis and evaluation of the brain for patients who struggle to remain stationary, such as those with dementia or epilepsy.

Funding: NIH Brain Initiative

### **31. Mitochondrial miRNAs: Novel Disease-Modifying Therapeutic Targets in Alzheimer's Disease**

Pooja Ajay Warriar (Monongalia County, West Virginia) and Emily Hone

Institution: West Virginia University

Field: Health Sciences (Neurobiology)

Faculty Advisor: Candice Brown

MicroRNAs (miRs) are small non-coding RNAs that act at the post-transcriptional level to regulate the expression of proteins. Mitochondrial miRs have been studied prominently for their crucial involvement in cellular aging, inflammation, and mitochondrial function in neurodegenerative diseases such as Alzheimer's disease (AD). Recent studies from our laboratory and others have identified miR-146a and miR-34a as being overexpressed in specific brain regions of AD patients. We found that an increase of these miRNA levels was highly correlated with a decrease in expression of a set of target mitochondrial proteins: phosphoglycerate kinases 1/2 (PGK1/2), hexose-6-phosphate dehydrogenase (H6PD), NADH dehydrogenase ubiquinone flavoprotein (NDUFV), and ubiquinol-cytochrome c reductase binding protein (UQCRB). The goal of the current study is to determine whether this correlation is maintained when two critical biological variables, sex and age, are manipulated. This study tested target protein levels throughout different age groups (3-24 months) for both sexes of wildtype (WT) and AD transgenic mouse models. miR-146a and 34a target protein levels in the hippocampus were quantified by Western blot and quantitative densitometry analysis. Our results show that hippocampal protein levels for NDUFV and UQCRB are highly dysregulated throughout aging, while H6PD and PGK1/2 exhibit sex differences in both WT and AD transgenic mice. The correlation analysis also showed the target protein H6PD is regulated by miR-146a in the early disease stage while miR-34a takes control over in the later disease stage. These results suggest that age and sex are determining factors in the application of disease-modifying therapeutic targets for AD.

Funding: NIH

### **32. Middle-Aged West Virginian's Perspectives Regarding Healthful Eating and Weight Management**

Ashley Gousios (Illinois)

Institution: West Virginia University  
Field: Health Sciences (Nutrition)  
Faculty Advisor: Melissa Ventura-Marra

Nearly 35% of men and 33% of women in West Virginia are obese making it the second highest prevalence rate in the nation. Middle-aged adults (43%) have higher rates than children, younger and older adults and are at increased risk for chronic conditions such as type 2 diabetes, hypertension and cardiovascular disease. Understanding residents' barriers to weight loss is key to developing culturally appropriate nutrition interventions. The purpose of this mixed methods study was to determine what factors participants felt facilitate or deter healthy eating behaviors and weight loss efforts. Thirty participants, 17 males and 13 females (45-64 years of age) completed online surveys and engaged in focus groups. Focus groups were analyzed using content and thematic analysis. Overall, addressable themes included factors such as time, cost, health concerns, and family influence. More men than women were motivated to lose weight by appearance and physical fitness, while more women were motivated by special occasions. Both felt convenience and temptation of unhealthy foods deterred them from sustaining a healthy diet. Most participants (96.6%) agreed eating healthfully and losing weight would benefit their health. However, despite recommendations by physicians to lose weight, most (44%) didn't feel they received enough information to facilitate change. They preferred to have one-on-one interventions with a dietitian either in their home (37%) or doctor's office (33%). Gender-specific nutrition interventions designed to include dietitians' advice and address overcoming barriers that prevent middle-aged adults from losing weight and eating nutritiously are needed.

Funding: Davis College

### **33. Electronic Cigarette Expectancies in Adolescents: Differences as a Function of Use**

Hayley Harman (Monongalia County, West Virginia)

Institution: West Virginia University  
Field: Health Sciences (Psychology)  
Faculty Advisor: Christina Duncan

Adolescent electronic cigarette use has become a prevalent public health concern. While the literature on adolescent use is expanding, little is known about differences between categories of adolescent users and non-users, including those using both conventional and electronic cigarettes (dual users). The present study aims to analyze differences in beliefs about e-cigarette use between different groups of adolescent tobacco users. A total of 632 middle and high school students (ages 12-19,  $M=15.96$ ; 58.6% female) in Ohio, Pennsylvania, and West Virginia completed questionnaires assessing demographics, lifetime and recent tobacco use, and beliefs about e-cigarette use (Smoking Expectancies Scales for Adolescents). A one-way ANOVA explored how smoking status (non-users, conventional cigarette users, e-cigarette users, and dual users) differed on beliefs regarding negative consequences and benefits of e-cigarette use. The groups differed significantly for perceived benefits ( $F(3, 499)=16.49, p<.001$ ) and costs ( $F(3, 495)=44.60, p<.001$ ). Post-hoc comparisons using Tukey HSD indicated that perceived benefits of smoking e-cigarettes were significantly higher among dual users ( $M=3.09, SD=1.78$ ) than the other three groups (Range of  $M=1.84-3.08$ ). Moreover, e-cigarette users ( $M=2.47; SD=1.89$ ) perceived significantly more benefits than non-users ( $M=1.84; SD=1.49$ ). For perceived costs in smoking e-cigarettes, only non-users ( $M=5.63; SD=2.39$ ) significantly differed from other groups (Range of  $M=2.93-5.63$ ), with non-users perceiving greater costs. Results suggest perceived benefits and costs of e-cigarette use vary significantly as a function of tobacco use. In the context of increasing trends of e-cigarette use among adolescents, understanding relationships between youth perceptions and their tobacco use offers opportunities for targeted public health interventions.

Funding: West Virginia University Department of Psychology

### **34. Mobile Health (mHealth) Use, or Non-Use, by Residents of West Virginia**

Alexis Popa (Ohio)

Institution: West Virginia University

Field: Health Sciences (Public Health)

Faculty Advisor: Peter Giacobbi

Mobile health (mHealth) involves the use of digital mobile devices and communication technologies (e.g., wearable sensors, mobile phones). mHealth draws from a variety of disciplines including computer sciences, electrical engineering, medicine, and the social and behavioral sciences. Recent reviews of this literature have shown encouraging findings but usage in West Virginia (WV) remains in question. Given that WV also has high rates of obesity, physical inactivity, smoking, and several chronic diseases, the purpose of this study was to compare mHealth usage in WV with national practices. We accessed Pew Foundation data in June 2016 focused on internet and mHealth usage. This data utilized probability samples of adults from each state in the United States and all reports and associated data are publicly available. Sampling weights were included with the original data and we used SAS 93 (Cary, NC) for all analyses. Results showed that the odds of a West Virginia resident using a mHealth device were about 80% less than the rest of the country (OR = 0.182,  $p = 0.0409$ , CI 0.036 – 0.932). Women in WV were almost 50% more likely to access mobile health information than men (OR = 1.452,  $p = 0.049$ , CI 1.120 – 1.884), and an increase in age also corresponded with increased mobile health usage (OR = 1.041,  $p < 0.0001$ , CI 1.033 – 1.049). The gap in West Virginians use of mHealth presents an opportunity to engage and empower WV residents to play an active role in their health and health care.

Funding: West Virginia Prevention Research Center

## **HUMANITIES**

### **35. Integrating West Virginia-Based Music into the State K-8 Social Studies Curriculum**

Alexandra Mullins (Kanawha County, West Virginia)

Institution: West Virginia University

Field: Humanities (Education)

Faculty Advisor: Travis Stimeling

Implementing music into educational curriculum is a creative, non-traditional facet for learning for students in grades K-8. Using music to support educational standards could advance children's knowledge regarding history, geography, civics, and many other academic disciplines. Students, including those with more creative skill-sets, could also have the opportunity to receive a more holistic education when incorporating the creative arts into their education. In this project, incorporating West Virginia-based music into K-8 state social studies curriculum standards aims to aid students in becoming more knowledgeable of the State's history, traditions and culture, as well as a broad overview of Appalachian regional culture. By integrating West Virginia-based music into their lesson plans, teachers could create a discourse between themselves and their students about the state's past and contemporary social, political and economic environments. Studies within K-8 classrooms have shown that incorporating music into the curriculum aided students in making critical connections between class material and worldly events. The purpose of this project is enhance critical thinking skills by using music to highlight key events and issues within West Virginia and to provide new contexts for understanding this material. The goal of this project is to produce a compact disc of West Virginia music and lesson plans for distribution to West Virginia History K-8 classrooms.

Funding: West Virginia University

### **36. Economic Warfare to Humanitarian Relief: Great Britain during the Napoleonic Era**

Lauren Griffin (Tennessee)

Institution: West Virginia University

Field: Humanities (History)

Faculty Advisor: Katherine Aaslestad

War creates economic hardships, population displacement and impoverishment. Although Great Britain avoided military occupation, decades of economic warfare with France generated distress at home and abroad. Smuggling emerged as a way to supply the continent with goods and provide for the war effort. Due to destroyed trade networks, war demands, new taxes, and the destruction of rural economies, the Continent faced widespread poverty. Smuggling became a shadow economy supported by the British to continue trade and undermine Napoleon's Blockade. By 1813, the Napoleonic Wars ravaged German communities. Some cities faced siege conditions or the horrors of combat. The harsh conditions generated displacement, war refugees, and economic crises, but also inspired a humanitarian response in which Great Britain established philanthropic organizations to ease the hardships. These relief efforts were sponsored by churches, German expatriates, merchants, abolitionists, and others. This research project has several related goals: to explore the English experience of war through economic warfare and smuggling, and the English response to continental war through humanitarian aid. I seek to reveal connections between these two areas of inquiry in merchant networks. The communication between German and British merchants throughout the war may have generated empathy for those facing the conflict on the continent. I am currently exploring the British press, primary source correspondences, and financial reports, as well as mapping geographical sites of donors. The results of this research project will offer broader insights into Great Britain's war experience, and also reveal connections between communities in the midst of modern war.

Funding:



### **37. Court of Chancery and Material Culture**

Morgan McMinn (Roane County, West Virginia)

Institution: West Virginia University

Field: Humanities (History)

Faculty Advisor: Kate Staples

The English Court of Chancery was a court of conscience, decisions were judged on testimony verbally given, not on submitted evidence. In the case of *Flower v Backeton*, 1540, Richard Flower contested a verdict made in another local London court that demanded he pay Edmund Backeton for saye cloth bought for his house. The saye cloth acted as a contract and each man viewed the contract differently. Flower thought the contract was between a friend, Thomas Palmer, who acted as the purchaser of the saye, and Backeton. However, Backeton saw the contract as a direct connection to Flower because the saye was destined for Flower's home. Using the lens of material culture, the study of how objects are being used by people, allows me to see the saye cloth acting as the contract binding them together despite the men's differing views. In turn, this lets me suggest that the Court of Chancery records hold more value for the historian beyond what formulaic debt cases might at first suggest. This poster demonstrates that this court record can be used to reveal the intricacies and delicacies of business dealings by displaying connections to trade, craft guilds, and politics.

Funding:

### 38. The Legacy of the Historic Blennerhassett Hotel

Megan Sayre (Wood County, West Virginia)

Institution: West Liberty University

Field: Humanities (History)

Faculty Advisor: Moonjung Kang

The purpose of this project is to identify how the legacy of the Blennerhassett Hotel in Parkersburg, West Virginia began and has lasted into modern times. Other nearby buildings from the same era have been destroyed, but the Blennerhassett has remained, and been preserved because it holds significance that is unmatched by other Parkersburg structures. In 1981 the property earned a spot on the National Register of Historic Places. The hotel had prominent and historically rich beginnings, as it was built by wealthy Parkersburg business man, William Chancellor and was named after Harman and Margaret Blennerhassett. The hotel features timeless and captivating qualities such as Queen Anne style architecture inside and out. Due to the grandeur surrounding it, the hotel has always been a showplace for the city and through restoration it continues to be. The structure has played an important role in Parkersburg's commerce and growth. It currently has an estimated annual income of 5 to 10 million dollars. The Blennerhassett Hotel has been a popular tourist destination incessantly. Its' legacy will perpetuate it to play an important role in Parkersburg for years to come. In order to ensure that this legacy will continue, it is important to continue investing in the preservation of the hotel, as well as promoting the history of the location.

Funding:



### **39. A Stilted Shift: The Southern Vowel Shift in Midland Appalachia**

Olivia Grunau (Monongalia County, West Virginia), Krislin Nuzum (Harrison County, West Virginia), and Janelle Vickers (Marshall County, West Virginia)

Institution: West Virginia University

Field: Humanities (Linguistics)

Faculty Advisor: Kirk Hazen

The West Virginia Dialect Project, established by Dr. Kirk Hazen in 1998, studies language variation in Appalachia and teaches the public about language in the Mountain State. Our current study focuses on vowels systems in WV. Vowels were chosen for two reasons: there is limited data on these systems, and vowels better indicate changes in regional characteristics, differences in social class, and most importantly the evolution of Appalachian identity over time. Our research analyzes the progression of the Southern Vowel Shift (SVS) throughout the state. Progress has been intermittent despite the state's southern designation, so we ask if this uneven progression a result of evolving demographics in Southern Urban centers, or if it is due to the stigmas placed on SVS. Our study investigates sociolinguistic interviews of 67 native Appalachians. Using FAVE, 51,000 vowels were analyzed for numerous measures. Linear mixed models were used to discern statistical trends and handle random variables. This paper focuses on the front vowel patterns of the SVS. Through the analysis of native West Virginian speakers, we have found correlations between vowel pronunciations and social information. Younger speakers vary in their productions of /i/ (as in kit) and /e/ (as in dress) depending on factors such as rurality and social class. The changes in /i/ and /e/ have become sociolinguistic stereotypes in WV, associated with rurality and negative traits. This diversity in WV vowels demonstrates diversity among Appalachian identities, and shifting vowel systems factor into the evolution Appalachian speech.

Funding: National Science Foundation

## SCIENCES

### 40. Ages of Landslides within Valles Marineris, Mars: Alex Hager and Andrew Schedl

Alex Hager (Kanawha County, West Virginia)

Institution: Marshall University  
Field: Sciences (Astrogeology)  
Faculty Advisor: Andrew Schedl

Landslides are a common feature in our solar system. Large landslides have occurred in the Kanawha. Understanding the causes of landslides in the solar system contributes to understanding landslides at home. ValleyValles Marineris, a canyon 4000 km long and up to 7 km deep, runs along the Martian equator. Within the canyon are >100km<sup>2</sup> landslides. Quantin et al (2004) determined ages for landslides by measuring areal densities of craters. However, recent work suggests that crater densities must be measured over areas  $\geq 1000$  km<sup>2</sup> for a valid age. Generally, Quantin et al (2004) examined areas <100km<sup>2</sup>, so the isochron ages may be unreliable. Furthermore, better quality images are available today than in 2004, so the landslides were re-dated and remapped. Our ultimate goal is to determine the causes of the landslides: meteorite impact, marsquakes and glacial retreat. Often our and Quantin et al.'s (2004) estimates of ages and landslide area were consistent. However, landslide 44 our estimate of size is 2590 km<sup>2</sup> and age is 1.9 Ga, whereas Quantin et al. (2004) size is 1348 km<sup>2</sup> and age is 0.1 Ga. To address our ultimate goal, as time passes, the rate of impact cratering decreases. 12 of the 26 dated landslides are less than a billion years old. This argues against meteorite impact as the sole cause of landslides.

Funding: Summer Undergraduate Research Experience (SURE)

#### **41. A Search for Fast Radio Bursts in Archival Green Bank Telescope Drift Scan Data**

Anika Rowe (Kanawha County, West Virginia)

Institution: West Virginia University

Field: Sciences (Astronomy)

Faculty Advisor: Maura McLaughlin

To date, there are only 17 cataloged fast radio bursts (FRBs), which are millisecond pulses of radio emission whose high dispersion measures (DM) for a given line of sight indicate that they originate from beyond the Milky Way. In this search, data from the Green Bank Telescope's 2007 drift scan survey taken at 350 MHz is undergoing re-processing for FRBs out to a DM of 5000 pc cm<sup>-3</sup> via single-pulse search software; the resulting plots are being inspected manually. The cause of these bursts is unknown, but by adding to the catalog of previously detected FRBs through searches like this, we may elucidate the source type, whether it is a known periodic radio source such as a pulsar or magnetar (which the newly-discovered repeating FRB 121102 may suggest), a cataclysmic event, or a new class of neutron star. If an FRB is detected in the data, it will be the first detection below 800 MHz; if FRBs are absent, we will set new limits on the properties of these sources at low frequencies.

Funding: National Science Foundation

## **42. Using Biofluorescence to Monitor Photosynthesis in Biodiesel Feedstock *Chlorella Vulgaris***

Paris Adkins (Cabell County, West Virginia)

Institution: Marshall University  
Field: Sciences (Biochemistry)  
Faculty Advisor: Derrick Kolling

The focus of this study is to elucidate the photosynthetic activity of microalga *Chlorella vulgaris* using pulse amplitude modulation (PAM) fluorometry. *C. vulgaris* is a microalga that is currently being studied for its use in biodiesel production. It has many of the advantages of other algal based biofuel feedstock such as being noncompetitive for arable land, its ability to grow on waste water, and it produces short chain fatty acids. *C. vulgaris* also has the ability to grow mixotrophically (simultaneous heterotrophic and photoautotrophic growth), which can allow for cultures to be grown in the dark; however, the extent of heterotrophic versus photoautotrophic activity in *C. vulgaris* grown in light conditions has not yet been determined. PAM fluorometry is a reliable and sensitive method of measuring photosynthetic activity in whole cells. By measuring the fluorescence emitted by the algae when the cells are subjected flashes of light, the mode of photosynthesis can be determined. This investigation used PAM fluorometry on *C. vulgaris*, grown in both light and dark conditions. Cells grown in the light ultimately yield the same biomass as cells grown in the dark while consuming equivalent amounts of glucose; however, they have a higher abundance of lipids. One hypothesis is that the cells are using cyclic electron transfer instead of linear photosynthesis. The purpose of this experiment is to determine which mode of photosynthesis the cells are using under the different growth conditions, which will assist in optimizing the photosynthetic efficiency of microalgae in general.

Funding:

### **43. Exploring Electron Transport in Photosystem II**

Armin Garmany (Kanawha County, West Virginia)

Institution: Marshall University

Field: Sciences (Biochemistry)

Faculty Advisor: Derrick Kolling

Photosystem II is a protein complex found in the thylakoid membrane of chloroplasts, an organelle central to the metabolism of plant cells and algae. Photosystem II contains a unique catalyst, the oxygen evolving complex, which removes electrons from water and generates oxygen as a byproduct. With energy supplied from the sun, photosystem II converts light energy into an electrical potential. We can better understand this phenomenon by studying how electrons are transported through this protein and the rest of the electron transport chain. This knowledge could allow scientists to create a photosystem II fuel cell that utilizes water to generate hydrogen. Exposing the photosystem II complex to a specific salt solution in an appropriate buffer allows for removal of the oxygen evolving complex. Under meticulous conditions and with a supply of manganese the oxygen evolving complex can spontaneously reassemble in a process known as photoassembly. Consequently, studying the assembly of this catalyst can provide further insight into the mechanism of efficient electron removal and electron transport seen in photosystem II. Removal of the oxygen evolving complex also allows for analysis of interactions of electron carriers located in photosystem II. Currently, experiments are being conducted that analyze electron transport in photosystem II with and without the oxygen evolving complex. Optimal conditions for photoassembly are also being established.

Funding: National Science Foundation

#### **44. Bumble Bee Diversity Trends of West Virginia**

Hunter Aliff (Kanawha County, West Virginia)

Institution: West Virginia State University

Field: Sciences (Biology)

Faculty Advisor: Sean Collins

The goal of our research is to assess the overall diversity of and to evaluate the presence and relative abundance of bumble bee species (e.g., *Bombus impatiens*, *B. bimaculatus*), in Kanawha County, WV. Bees were collected from a variety of field sites throughout Kanawha County to determine current local population numbers and community structure. To determine the population dynamics and community structure of bumble bees over the last century, we compiled data from regional collections from the WVDA and museums dating back to the early 1900's. Our data indicated that while the bumble bee community of West Virginia currently is dominated (~95% of total specimens collected) by three species (*B. impatiens*, *B. bimaculatus* and *B. griseocollis*), this has not always been the case. In the past, the bumble bee community of WV was less skewed, and while *B. impatiens*, *B. bimaculatus* and *B. griseocollis* were prevalent even then, their dominance was not as pronounced as it is presently. Most notably, the decline of *B. pennsylvanicus* across the state has been quite dramatic and we hypothesize that this shift in community dynamics has enabled other *Bombus* species to become more abundant in its absence.

Funding:



#### **45. Truffle Abundance and Diversity in the Forests of West Virginia**

Hunter Armstead (Kanawha County, West Virginia)

Institution: West Virginia State University

Field: Sciences (Biology)

Faculty Advisor: Mark Chatfield

The truffle is an elusive and delicious underground fungus found in many parts of the world, often growing within the root network of trees deep in forests, hidden from human eyes. Volatile compounds will need to be identified in our truffle species using solid phase extraction and GC-MS for their identification. These compounds are essential to both the culinary appeal of these fungi, and their ability to be located by trained dogs. DNA bar-coding techniques are being developed to aid in taxonomic placement of discovered fungi, so tests are being run to study the DNA of previously described truffles including the Summer Italian Truffle (*Tuber aestivum*) and the Perigord black truffle (*Tuber melanosporum*) as models. We have successfully isolated DNA in *T. melanosporum* using a soil, DNA extraction method developed by Mo Bio Laboratories, Inc. Species specific primers, PCR and agarose gel electrophoresis of previously-sequenced, amplified DNA will be used to confirm truffle species identification.

Funding: SURE

#### **46. Optimization of DNA Extraction Protocol for Herbarium Preserved Rubus Tissue**

Edwina Barnett (Ohio)

Institution: West Virginia State University

Field: Sciences (Biology)

Faculty Advisor: Barbara Liedl

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. There is a lack of genetic and morphological diversity due to the domestication of Rubus. However, wild species of Rubus offer many desirable traits for breeders to access. Although this may be true, the taxonomy of the genus is complex. Interspecific hybridization, polyploidy, various growth habits, along with the lack of a universal species concept complicate breeder attempts to obtain these desirable traits. Therefore, a solid understanding of the evolutionary relationship within the genus is needed for breeders to take advantage of these traits. Herbarium Rubus specimens hold much of the necessary genetic material needed to conduct a molecular based study. These specific specimens are key because they have been named by authorities based on morphology, but a genetic study is still necessary to help identify synonyms amongst the species. In order to achieve this molecular based study of herbarium Rubus a DNA extraction protocol was optimized. PCR and sequencing success of the herbarium samples extracted from the optimized extraction protocol showed minimal improvement in comparison to the original protocol. Furthermore, success rates of PCR and sequencing of the fresh tissue was less successful than the original protocol.

Funding: KY-WV Louis Stroke Alliance for Minority Participation

#### **47. Identification and Validation of Microbial Community involved in Watermelon Fruit Development**

Bandana Ghimire (in place of Avery Brown)

Institution: West Virginia State University

Field: Sciences (Biology)

Faculty Advisor: Reddy Umesh

Watermelon fruit is an important diet source owing to its richness in water, sugar, fiber, vitamins, amino acids, minerals and phenolic compounds. However, most of these microorganisms are unknown since they cannot be cultured in laboratory media, or the physiological characteristics and culturing condition are not fully understood. Metagenomics approach the study of whole genome transcription and transcription regulation directly from samples collected from environment, which helps to reveal the hidden diversity of microbial life. The aim of this study is to sequence microbial RNA and DNA isolated from different watermelon cultivar fruit flesh, analyze species and species complexity, analyze gene expression, and validate gene expression by quantitative PCR. The 16S ribosomal RNA (16S rRNA) gene was sequenced by next generation sequencing (NGS) and analyzed by bioinformatics tools to determine microbial population and its significance. A wide variety of microbial phyla was found in all sampled watermelon varieties. Proteobacteria was the most abundant phyla in all samples, followed by Ascomycota, Basidiomycota and arbuscular mycorrhizal Glomerulomycota. A total of 71,588 genes were observed in this study, among them 11.32% related to carbohydrate metabolism, 7.7% related to metabolism of amino acids, 6.7% related to signal transduction, and the rest of the genes distributed for other functions, possibly as a reservoir of additional gene source in hosts. This study helps to understand significance of microbes present in watermelon fruits, the interaction between them, and their role in fruit ripening. The results from this study will be a model for other fruits and vegetables.

Funding:

#### **48. In Vitro Effects of Coal Dust on Mammalian Cell Proliferation and Progesterone Receptor Expression**

Miranda Buckley (Kanawha County, West Virginia) and Victoria Ramey (Kanawha County, West Virginia)

Institution: West Virginia State University

Field: Sciences (Biology)

Faculty Advisor: Gerald Hankins

Many organic compounds that can be found in water contaminated by extractive industry wastes may have the ability to disrupt signaling by steroid hormones. Although studies have been done on effects on estrogen and corticosteroid signaling, very little has been done on effects on progesterone signaling. Here we begin investigation on effects of exposure to coal waste on cell proliferation and expression of progesterone receptors in two lines of mammary tumor cells from mice. One cell line, 4T1, is known to express the estrogen receptor ESR1 while the other line, JC, does not express this receptor. We evaluated the proliferation of the cells after treatment with: progesterone, RU486 (a progesterone receptor inhibitor), and coal dust. Proliferation of the 4T1 cells increased by 4.6% when treated with progesterone and increased by 7.1% when treated with RU486 compared to a vehicle control. Proliferation of the JC cells decreased over all treatments compared to control cells. In both cell lines, cell proliferation decreased by 23.0% when treated with coal dust relative to the cells treated with vehicle control. Using quantitative PCR, relative expression of five progesterone receptor genes was determined per treatment in 4T1 cells. Analysis indicated a trend of increased gene expression for four of the five genes when cells were treated with RU486. Expression varied greatly per gene after progesterone treatment. Little difference in gene expression was observed after coal dust treatment, but because of variability in reference gene expression, further assessment is necessary to determine the effect of coal dust.

Funding: EPSCoR

#### **49. Protection Ability of Starvation-adapted *Pseudomonas aeruginosa* Strain ATCC 12055 in a Mouse Model**

Chase Chambers (Preston County, West Virginia)

Institution: Bluefield State College  
Field: Sciences (Biology)  
Faculty Advisor: Tesfaye Belay

*Pseudomonas aeruginosa* is an opportunistic pathogen known to cause numerous infections in animal models and human subjects. *P. aeruginosa* has been implicated as a serious health problem during stressful conditions including space flight. Studies have attempted to identify the ability of this organism to exist in various environmental stresses including water. The viability of *P. aeruginosa* ATCC 12055 in water while maintained under starvation is more than 4 years. Starved cells are less virulent to mice than non-starved cell of the parent strain. The purpose of this project was to test the protection ability of long-term starved cells against a lethal dose of the parental strain to mice. We hypothesized that starved cells of *P. aeruginosa* have decreased pathogenicity ability and are a potential candidate for protection study. We tested the protective efficacy of formalin-killed starved cells against lethal dose of non-starved cells of ATCC 12055. Immunization with Formalin-killed *P. aeruginosa* of starved cells for 6 h resulted in 64% protection in mice challenged with a lethal dose of the parental strain. Moreover, immunization 24 h resulted in 92% protection in mice challenged with a lethal dose of the parental strain compared to 14% protection compared to non-immunized mice. The role of peritoneal cells in phagocytosis or antibodies in protection against infection with lethal doses of *P. aeruginosa* was determined by measuring bacterial loads following phagocytosis experiments. Over 20% of starved cells were phagocytized compared to 5-8% phagocytized of the parental strain of ATCC 12055. Peritoneal cell counts in immunized mice was markedly high (three-fold increase) compared to counts in non-immunized mice.

Funding: WV-INBRE, NIH, NASA

## **50. Measurements of the Costal Cartilages: Implications for Facial Reconstructive Surgery**

Maria Ganoe (Maryland) and Hannah Lynch (Pennsylvania)

Institution: West Liberty University

Field: Sciences (Biology)

Faculty Advisor: Matthew Zdilla

Over the past seventy-five years autologous costal cartilage has been used for diverse surgical reconstructions including reconstruction of the ear, nose, and midface. Despite the wide utilization of costal cartilage grafts, there is little agreement regarding which cartilage level and which particular portion of each costal cartilage is most optimal for grafts of varying sizes. Furthermore, there have been few studies dedicated to understanding the size of costal cartilage. Therefore, the aim of this study is to provide salient measurements that will aid in the selection of optimal costal cartilage harvests. The study analyzed the left and right sides of the most commonly utilized costal cartilages (the 5th, 6th, and 7th costal cartilages) from sixteen cadaveric rib cages. The results of this study will provide a starting-point in the development of an algorithm that will enable selection of optimal cartilage for use in facial reconstructive surgery based upon the desired graft size.

Funding:

## **51. Endocrine Disrupting Effects of Arsenic in Water**

Leslie Garcia (California)

Institution: West Virginia State University

Field: Sciences (Biology)

Faculty Advisor: Gerald Hankins

Arsenic is a persistent toxin that occurs naturally in trace amounts in rocks, sediments and coal. It can often be found in pyrite associated with coal in the central Appalachian region. Because pyrite in coal oxidizes rapidly, coal storage facilities and waste materials from coal washing operations are potential sources of arsenic mobilization. One set of studies have shown elevated arsenic levels in people from coal mining areas of eastern Kentucky. At high concentrations, arsenic is associated with various diseases including cardio vascular disease, diabetes and cancer of the skin, lung, liver, bladder, kidney and breast. In recent years, there have reports of arsenic compounds functioning as endocrine disrupting compounds which can affect estrogen signaling. We evaluated the response of a mouse mammary cancer cell line, 4T1, to one arsenic compound, sodium arsenite that has been reported to effect estrogenic signaling. 4T1 cells are positive for the estrogen receptor ESR1. Results indicate slightly greater proliferation of cells treated with 1 micro molar of sodium arsenite than for untreated cells. However quantitative polymerase chain reaction (qPCR) results did not indicate significant changes in expression of ESR1 or the estrogen-responsive gene FOXM1 in arsenite-treated cells compared to untreated cells. We are currently evaluating effects on human tumor cells that express the estrogen receptor.

Funding: Higher Education Policy Commission SURE grant

## **52. Changes in Gene Expression Due to Chronic Exposure to Opioids in the Water Supply**

Ramin Garmany (Kanawha County, West Virginia)

Institution: Marshall University

Field: Sciences (Biology)

Faculty Advisor: Philippe Georgel

Opioid use is prevalent in southern West Virginia, as demonstrated by the alarmingly high rate of Neonatal Abstinence Syndrome (NAS) at Cabell Huntington Hospital. NAS refers to the withdrawal symptoms that occur to a child who is born addicted to a certain drug. To help alleviate the symptoms of withdrawal, buprenorphine, an opioid, is administered over a few weeks until the infant is progressively weaned off the drug. Opioid exposure has been shown to affect brain development of the newborn; thus, understanding the importance of its effects on brain development are crucial. In addition, studies have demonstrated that illicit drugs, such as opioids, may be present in the local water supply due to inadequate filtration of wastewater. The low concentrations of opioids found in the water supply may lead to chronic effects on expression of specific genes' subsets in the local residents. More specifically, the opioid may not necessarily change the DNA sequence, but rather the way in which the genes are expressed. We are focusing on investigating changes in gene expression that may occur in the cells lining the blood vessels in the brain mediated by chronic, low dose exposure to buprenorphine at levels slightly lower than that found in the water supply. The results will provide evidence of the effects of buprenorphine's chronic exposure on the local residents who are using local water supplies.

Funding: National Science Foundation (EPSCoR)



### **53. Evolutionary Analysis of Monopyle (Gesneriaceae) from Central America**

Carrie Huffman (Nicholas County, West Virginia)

Institution:      Glenville State College

Field:              Sciences (Biology)

Faculty Advisor: Jeremy Keene

There are currently six species and one variety of *Monopyle* Benth. Described for Central America. The largest percentage of taxa are reported from premontane to montane forests in Panama and Costa Rica from 300 – 1300 m. *Monopyle puberula* Morton and *Monopyle maxonii* Morton are the most widely distributed in this region with the other species being endemic to narrow geographic areas. Systematic studies towards a revision of *Monopyle* have revealed four distinct new species for the region that were commonly lumped within *Monopyle macrocarpa* Benth. Morphological assessment of *Monopyle macrocarpa* from the region show that this taxon, however, does not occur in Central America and is restricted to northern Peru. The newly discovered species can be distinguished by a suite of characters including petiole length, density of pubescence, corolla shape coupled with color, and calyx shape. Ongoing molecular and morphological studies in the genus will be used to confirm the relationships of the species to other taxa in the genus and tribe.

Funding: NASA WVSGC

## 54. Estrogenic Effects of Coal Dust

Dylan Jayasuriya (Kanawha County, West Virginia)

Institution: West Virginia State University

Field: Sciences (Biology)

Faculty Advisor: Gerald Hankins

Coal dust is a contaminant in areas where coal is mined or processed including the Kanawha River basin. It is hypothesized that coal dust may contain compounds that can activate estrogen receptors. Estrogen receptors (ER) are known to regulate expression of genes that regulate cellular processes such as proliferation, migration, stemness and apoptosis. Estrogen and estrogen receptors have important roles in normal development as well as breast cancer. We investigated effects of estrogen and coal dust on estrogen responsive genes in mouse breast cancer cell line 4T1. FOXM1 and ESR1 genes have ER binding sites in their promoter regions and respond to estrogen. Quantitative RT-PCR analysis showed FOXM1 and ESR1 mRNA levels increased significantly compared to control on treatment with higher concentrations (1 and 2  $\mu\text{M}$ ) of 17 $\beta$ -estradiol, a physiological estrogen; whereas, anti-estrogen (ZK 164015) treatment decreased the mRNA levels. Similar to estrogen, treatment with coal dust increased FOXM1 expression in breast cancer cells. Thus, we concluded that estrogen as well as coal dust are activators of estrogen responsive genes FOXM1 and ESR1. Cell proliferation/viability assay showed high concentration-estrogen treatment increased cell proliferation compared with control; whereas, anti-estrogen treatment decreased the number of cells. In future we plan to conduct more experiments which will include human cell lines and with low estrogen concentrations. Also, we would like to investigate if the estrogen and coal dust induced activation of these genes is uniquely mediated by estrogen receptor.

Funding: EPSCoR

## **55. Examining Growth, HPI Axis Hormone Expression, and Locomotion in Zebrafish *gs homeobox 1* Mutants**

Sarah Peterson (Putnam County, West Virginia)

Institution: West Virginia University

Field: Sciences (Biology)

Faculty Advisor: Sadie Bergeron

The hypothalamic-pituitary-adrenal/interrenal gland axis (HPA/I axis) regulates homeostatic processes, growth, and development of fish and mammals. The gene *gs homeobox 1* (*gsx1*) is expressed in the developing hypothalamus in a number of vertebrates examined to date. Loss of *Gsx1* in mouse results in reduced expression of some HPA axis hormones and significantly reduced overall body growth. Due to the fragile nature and early death of mouse *Gsx1* knockouts, we will use zebrafish *gsx1* mutants that we generated using TALENS to study the onset and degree of these growth deficits. We will also examine HPI axis hormone expression and an abnormal swimming behavior displayed by *gsx1* zebrafish mutants in some detail. Thus far, we have observed significant differences in size between *gsx1* mutants and heterozygotes compared to their wild type siblings at 14 days post fertilization (dpf) and 1 month old. We have also observed reduced growth hormone expression in the pituitary of *gsx1* mutants, which supports our work being relevant to the effects of loss of *Gsx1* in mammals. In addition, we have seen adult mutant fish swim for longer than normal bouts of time into the sides of their tank, which may be related to altered expression of hormones that regulate stress or aggression. We plan to extend this work to additional time points for all phenotypes and to test locomotion under different environmental contexts. Through this study we aim to better characterize the roles of *gsx1* in HPI/A axis development and function.

Funding: NASA West Virginia Space Grant Consortium

## **56. 3-Hydroxyterphenyllin Induces S Phase Arrest in Ovarian Cancer Cells**

Alexa Pigliacampi (Florida)

Institution: Alderson Broadus University

Field: Sciences (Biology)

Faculty Advisor: Yi Charlie Chen

Epithelial ovarian cancer is the fifth most common cause of cancer-related death among women in the United States. In 2016, there will be approximately 22,280 new diagnoses of ovarian cancer and 14,240 predicted deaths. 3-Hydroxyterphenyllin is a secondary metabolite of fungus, *Aspergillus candidus*. The nature of similar metabolites in fighting disease and other tumor types indicates that 3-Hydroxyterphenyllin (3-HT) is likely to have anticancer properties. In this study, we evaluated 3-HT as a potential anti-cancer agent using human ovarian cancer cells, MTS assay, flow cytometry and western blot analysis of various cyclins, CDKs and proteins using primary and secondary antibodies. 3-Hydroxyterphenyllin reduced cell viability and induced S phase cellular arrest for OVCAR-3 and A2780/CP70 cells by upregulating CyclinB1 and Cdc25A expression and inhibiting Cdk4, CyclinA2 and CyclinE1. Progression through the cell cycle is dependent on various cyclin concentrations that activate CDKs, cyclin-dependent protein kinases. Reduced levels of cyclins result in reduced CDK-cyclin complexes initiating cell cycle phase transitions phases and less cells entering the subsequent phase. The results of the study indicate that 3-Hydroxyterphenyllin has potential to fight ovarian cancer cell growth by preventing progression past S phase of the cell cycle. (Supported by NIH Grant 200200016-62401 to the West Virginia IDeA Network for Biomedical Research Excellence)

Funding: NIH, WV-INBRE

## 57. Building a Ribosomal database for Anthobothrium from Sharks

Saira Rizwan and Umer Rizwan

Institution: West Virginia State University

Field: Sciences (Biology)

Faculty Advisor: Tim Ruhnke

Van Beneden (1850) erected the tapeworm genus *Anthobothrium* and since then a number of species have been added to the genus. The genus has a complicated taxonomic history. Ruhnke and Caira (2009) identified two new species and re-described *Anthobothrium laciniatum*. They also noted that *Anthobothrium* was most certainly a polyphyletic taxon. The present study concerns species that are part of *Anthobothrium sensu stricto*. That is, the work focuses on the monophyletic subset of *Anthobothrium* species that are consistent in morphology with the type species of the genus, *A. cornucopia*. The study aims to continue in the creation of a dataset of 28S D1-D3 ribosomal DNA for *Anthobothrium* from a variety of shark species, and to examine patterns of host specificity for species of the genus. A total of 28 PCR amplicons from 11 samples of *Anthobothrium* were recovered during the research project. A Bayesian analysis for 28S rDNA for 11 putative *Anthobothrium* species that was performed revealed that *Anthobothrium* species exhibit relaxed host specificity, as most species parasitize multiple shark host species. This finding is inconsistent with the pattern of stricter host specificity found for many tetraphyllidean and phyllobothriidean tapeworms from cartilaginous fishes, but is similar to the more relaxed host specificity found for species of *Paraorygmatobothrium*. Interestingly, species in both *Paraorygmatobothrium* and *Anthobothrium* commonly parasitize carcharhinid sharks.

Funding: Higher Education Policy Commission (HEPC) SURE Grant

## 58. Nanosilver: An Effective Treatment for Intracellular Bacterial Infections

Elijah Roberts (Putnam County, West Virginia)

Institution: West Virginia State University

Field: Sciences (Biology)

Faculty Advisor: Bingyun Li

The use of silver as an antimicrobial agent dates back to the Phoenicians who used silver-coated bottles to protect contents from contamination. Modern nanotechnology has helped silver reach new popularity in the form of nanosilver, which has impressive bacteria-killing activity. With demonstrated uses including drugs, wound dressings, coating of medical and surgical equipment, and water treatment, nanosilver serves as an effective treatment for bacteria which reside outside of the cell which are also known as “extracellular bacteria.” However, there are no reports regarding the eradication of “intracellular bacteria,” which reside within cells, by nanosilver. Intracellular bacteria are the leading cause of recurrent infections, and conventional antibiotics require high concentrations with very harmful side-effects to treat these infections. Moreover, the bacteria is becoming resistant to conventional antibiotics. Therefore, this study was undertaken to investigate the effectiveness of nanosilver as an alternative treatment for intracellular bacterial infections. Human bone cells were grown alongside a clinical strain of bacteria, *Staphylococcus aureus*, obtained from a patient’s wound at Ruby Memorial Hospital. After the extracellular bacteria were removed, different concentrations of 40 nm particles of nanosilver were tested for 2 hours to determine their bacteria-killing effects. Nanosilver concentrations of 40  $\mu\text{g/mL}$  and above resulted in ~75% killing of intracellular *S. aureus* yet only killed 10% of the human bone cells. Changing the treatment duration did not improve the effectiveness of the treatment.

Funding: WV-INBRE

## 59. The Significance of *Sodalis* pheA Towards the Metabolic Integration of Tsetse Symbiosis

Hunter White (Kanawha County, West Virginia)

Institution: West Virginia University

Field: Sciences (Biology)

Faculty Advisor: Rita Rio

The tsetse fly (Diptera: Glossinidae) is the obligate vector of African trypanosomes, the causative protozoan parasites of Human African Trypanosomiasis (HAT) and Nagana, a wasting disease of other animals. In addition to potentially harboring trypanosomes, the tsetse fly contains a relatively simple microbiome consisting of three vertically transmitted bacteria that vary in their host relation: the parasitic *Wolbachia pipientis*, the obligate mutualist *Wigglesworthia glossinidia*, and the commensal *Sodalis glossinidius*. Tsetse flies are strictly sanguivorous by nature, which limits their nutrient intake drastically. The microbiome is believed to play multiple roles towards improving host biology, including supplementing the strict blood diet with essential missing nutrients. In the commensal *Sodalis* genome, the retention of the chorismate mutase P/prephenate dehydratase (*pheA*) gene is of particular interest due to its potential involvement in the innate immune response, known as melanization, towards tsetse cuticular wound healing. Additionally, the *Sodalis* *pheA* gene is believed to integrate with the *Wigglesworthia* chorismate pathway towards the production of the essential amino acid phenylalanine. I hypothesize that by mutating *Sodalis* *pheA*, the tsetse host will show reductions in melanization response, fecundity, and life longevity. Furthermore, the density of the auxotroph *Wigglesworthia* should be negatively affected by the loss of a functioning *Sodalis* *pheA* gene due to the loss in the availability of phenylalanine.

Funding: National Institute of Health (NIH)

## **60. Preventing Waste and Saving Precious Metals: Exploring Recyclable Nickel Catalysts for Organic Reactions**

Brenna Becca (Ohio County, West Virginia)

Institution: Wheeling Jesuit University

Field: Sciences (Chemistry)

Faculty Advisor: Rebecca Haley

Green Chemistry is an emerging field of study in which the importance and significance is widely acknowledged. The focus of this research is to explore solventless chemistry in the interest of preventing waste and hazardous substances. For example, this is important in the pharmaceutical industry because in order to get the small amount of drugs needed, a significant amount of solvent is used, but not incorporated into the product. Rather, it is thrown away as waste. Mechanochemistry is a subfield of chemistry in which solvents are not necessary. The high-speed ball mill is the tool we use in mechanochemistry to do organic reactions. In addition to using solvents, we can also use recyclable nickel metal pellets as a catalyst, which are often needed to do organic reactions. In this research, we are investigating carbon-carbon insertion reactions, which are needed to make the building blocks needed in the pharmaceutical industry. So far, we have looked at the addition of diphenylacetylene to biphenylene as a start to examining catalytic carbon-carbon bond activation.

Funding: Wheeling Jesuit University



## 61. Modification of the Surface of Zinc Oxide Nanoparticles to Increase Efficiency of Solar Cells

Grayce Behnke (Pennsylvania)

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

Self-assembled monolayers (SAMs) are molecules that bind to solids through adsorption. SAMs can be used as sensors for lethal bacterial enzymes, pH and conductivity indicators, and can inhibit corrosion. SAMs are incredibly useful due to the ability for chemical binding of molecules to the surface of a metal, like zinc oxide (ZnO), and can greatly change chemical and physical properties. ZnO specifically has a large variety of properties that are useful for surface modification. These properties include a wide band gap (3.37 eV), high exciton binding energy (~60 meV), and stable wurtzite structure. Through the process of SAMs, the surfaces of ZnO nanoparticles are modified with 16 phosphonohexadecanoic acid, 11 phosphoundecanoic acid and 11 undecynylphosphonic acid. After binding an organic compound to a ZnO surface 5 aminofluorescein is attached to the organic molecule in order to serve as a fluorescent marker that can be used for determining the new properties of the modified surface. By changing the properties of the ZnO surface layer, solar cell efficiency can be altered by decreasing corrosion and increasing energy efficiency. The sample concentration and use of "linker" molecules will be altered in order to determine the optimum conditions for the modifications to the ZnO surface and the success of modification will be determined using infrared spectroscopy, dynamic light scattering, zeta potential, ultraviolet-visible spectroscopy, scanning electron microscopy, and electrochemistry. UV-Vis spectroscopy was used to determine the band gap of the surface modified nanoparticles.

Funding:

## 62. Synthesis of Luminescent Zirconium (IV) Complexes

Anne Belldina (Monongalia County, West Virginia)

Institution: West Virginia Wesleyan College

Field: Sciences (Chemistry)

Faculty Advisor: Carsten Milsman

Transition metal photosensitizers have become a topic of interest due to their potential applications in photovoltaic cells, solar fuels, and photoredox chemistry. Current photosensitizers are costly and use transition metals with low earth abundance. We chose to utilize zirconium because of its low cost and high earth abundance, making it a better candidate for large scale applications. Zirconium complexes carrying 2,6-bis (pyrrolyl)pyridine ligands have been synthesized and characterized. By coupling a pyridine with pyrrolyl moieties, we have created redox active ligands that enhance the redox potential of the complex by creating a push/pull movement of electrons throughout the molecule. Unlike current photosensitizers, which employ electron rich metal centers, such as ruthenium and iridium, and electron withdrawing ligands to form a metal-to-ligand charge transfer (MLCT), our complexes employ an electron deficient metal center and electron withdrawing ligands that form a ligand-to-metal charge transfer (LMCT). We have developed a straightforward modular method of ligand synthesis that allows us to easily alter substituents in order to tune and study the steric, optical, and electronic properties of the zirconium complex.

Funding: NSF

### 63. Ligand synthesis for Aqueous Metal Detection

Morgan Bright (Kanawha County, West Virginia) and Josh Ricket (Ohio County, West Virginia)

Institution: West Virginia State University

Field: Sciences (Chemistry)

Faculty Advisor: Micheal Fultz

Metal ions are one of the major pollutants and has entered into our environment through a number of human activities or natural sources. These pollution sources include industrialization, mining, and natural sources like dissolving rocks. Two metals that are of particular interest is uranium and aluminum. Aluminum can be detected and concentration estimated by using many techniques and instruments. But the 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. Aluminum toxicity is a major problem in large areas of the US east of the Mississippi River including WV. Uranium in the environment occurs primarily as 3 of 17 known isotopes,  $^{238}U$ ,  $^{235}U$ , and  $^{234}U$ . All are radioactive; however, it is the chemical toxicity that is its greatest ecological risk. The thrust of the second project is to generate an organic ligand with a high affinity for the uranyl ion. The uranyl ion is highly fluorescent, and we believe very compatible with the single molecule imaging systems available within the WV EPSCOR network. Optical detection of contaminants can be considered a highly sensitive method for their analytical quantitation. Detection of these metals through fluorescence would provide West Virginia a powerful tool to monitor our waterways for potential environmental hazards and build research partnerships with WV's universities.

Funding: NASA

#### **64. Effects of Biochar on Soil Respiration and Carbon Sequestration**

Kimberly Cavender (Kanawha County, West Virginia)

Institution: West Virginia State University

Field: Sciences (Chemistry)

Faculty Advisor: Amir Hass

Biochar is a carbon-rich co-product produced during fast pyrolysis, a thermal conversion of plant biomass into bio-oil under limited supply of oxygen. When used as a soil amendment, biochar has a potential to improve soil fertility. The biomass to bio-oil fast-pyrolysis conversion pathway can reduce overall CO<sub>2</sub> emission. With much of its carbon in recalcitrant form, biochar is expected to increase soil organic matter as well as increase soil carbon sequestration. Using an incubation study, the effects of different feedstock and biochar application rates were tested on respiration and net release of CO<sub>2</sub> from biochar amended soils. Selective extractions were used to determine the different biochar's soil carbon and nitrogen composition and to predict the effects of biochar on soil respiration. The current results of this research indicate that the amount of nutrients found in the amended soils follow the expected trend, showing an increase in available nutrients with the addition of biochar, which in turn improves soil fertility and crop production.

Funding: SURE

## 65. Eco-Friendly Transfer Hydrogenation of Diphenylacetylene Using High-Speed Ball-Milling

Rishi Chandrasekhar (Ohio County, West Virginia)

Institution: Wheeling Jesuit University

Field: Sciences (Chemistry)

Faculty Advisor: Rebecca Haley

Green chemistry is a blooming discipline that is gaining notoriety in the past 25 years, the focus being on waste prevention of chemicals, maximization of products, reduction of hazardous chemicals in favor of safer alternatives, and to use more renewable compounds for reactions. Shifting the approach of chemistry to this conservation of chemicals is important and inevitable if we want to continue pursuing chemical research in an optimal manner that is safe for society and sustainable for the environment. In this project we focused on the issue of solvents being a large contributor to waste in reactions, as well as being volatile and harmful to humans. To help solve this waste problem, we used mechanochemistry via ball-milling to see if a reaction, specifically a transfer hydrogenation, would occur without the use of any solvent using first row transition metals, recycled second row transition metals, and a hydrogen source of water. Transfer hydrogenation is an important reaction for the reduction of compounds and this method takes advantage of using a hydrogen source that isn't too reactive, poisons the catalyst, or requires special equipment. Using the ball mill process, metals; like Mg, Zn, Pd, and Ni with water and our reactant diphenylacetylene we began a study into transfer hydrogenation.

Funding: Wheeling Jesuit University

## **66. Computational Characterization of Cell Membrane Interactions with pH (Low) Insertion Peptide (pHLIP)**

Austin Clark (Kanawha County, West Virginia), Zachary Bonham (Monongalia County, West Virginia), and Jaycie Saseen (Randolph County, West Virginia)

Institution: West Virginia University

Field: Sciences (Chemistry)

Faculty Advisor: Blake Mertz

pH (low) insertion peptide (pHLIP) is a molecule that can selectively penetrate cell membranes under acidic conditions. This inherent characteristic of pHLIP makes it a promising tool in drug delivery and diagnostic imaging of tissues associated with acidosis, such as cancer, arthritis, and heart disease. However, the molecular interactions that control the function of pHLIP are poorly understood. Computational modeling allows us to study these molecular interactions at a level of detail that is inaccessible to most conventional experimental techniques. One of the key events in pHLIP function is the formation of a helical structure on the cell membrane surface, which is the focus of this project. By modeling the helix formation required for pHLIP penetration using free energy techniques, we can obtain a fundamental understanding of the energy involved in this process. This process has been separated into the individual components of binding and helix formation: 1) pHLIP in solution; 2) pHLIP at the membrane surface, and 3) pHLIP bound to the membrane. Our long-term goal is to understand the energy changes that occur during the complete process of pHLIP insertion with the intent to predict the pKa of insertion and the free energy involved in each step of pHLIP function.

Funding:

## **67. Water Quality Testing of Treated Acid Mine Drainage at Morris Creek**

Logan Cox (Wood County, West Virginia)

Institution: University of Charleston

Field: Sciences (Chemistry)

Faculty Advisor: Juliana Serafin

This research focuses on testing water quality at Morris Creek and understanding the impact of soluble metal ions on the effectiveness of treatment for acid mine drainage (AMD). Morris Creek is located near Montgomery, West Virginia and is affected by AMD. AMD is the leakage of generally, but not always, acidic water out of an abandoned mine. AMD is created through chemical reactions that occur within the abandoned mines and usually depends on coal type, which other minerals are present, and water flow rates. The Morris Creek Watershed Association has implemented a limestone bed remediation process. Water samples were collected from three different sites chosen at different points along the remediation process. Samples have been tested using nine standard water quality index tests. In addition to these tests, the iron, aluminum, and calcium concentrations were analyzed by Atomic Absorption (AA) spectroscopy. The results show that the water quality is lower in the water coming directly out of the mine and after the remediation than in the water upstream from the mine drainage and remediation. All three metal ions were detected in the samples, and their role in treatment effectiveness is examined.

Funding:

## 68. Synthesis of Copper-Based Carbon Monoxide-Releasing Molecules for Therapeutic Applications

Sarah Liller (Hardy County, West Virginia) and Kelsie Krantz (Randolph County, West Virginia)

Institution: West Virginia Wesleyan College

Field: Sciences (Chemistry)

Faculty Advisor: Joanna Webb

Carbon monoxide (CO), known to be toxic, is a naturally generated gas in the human body. Free CO in the body possesses anti-inflammatory and anti-apoptotic properties and is used to induce positive therapeutic effects such as vasodilation. The current method for using CO in therapeutic applications is inhalation, which is not able to target specific sites in the body. However, carbon monoxide-releasing molecules (CO-RMs) based on transition metal carbonyl complexes are being investigated to circumvent this limitation by releasing CO under physiological conditions (i.e., changes in pH), after temperature changes, or after exposure to light. Many CO-RMs that have been synthesized to date have used second and third row transition metals that are not always biologically compatible. In this study, previously reported and novel copper based carbonyl complexes, which should be more compatible, are being synthesized and characterized via NMR and infrared spectroscopy in order to study their CO-releasing properties. These complexes will be supported by amino acid or amino acid derivative ligands in order to increase water solubility and maintain bio-compatibility.

Funding:



## **69. Polymorphs and Solvates of Erlotinib and Dasatinib**

Taylor Maddox (Putnam County, West Virginia)

Institution: Marshall University

Field: Sciences (Chemistry)

Faculty Advisor: Rosalynn Quinones

Polymorphism is the capacity for a molecule to change its crystalline lattice and have other crystalline forms. Polymorphs of pharmaceutical compounds can have different properties and elicit different responses than their commercial forms. Erlotinib and Dasatinib, tyrosine kinase inhibiting chemotherapy drugs, are used to prevent cancer cells from growing and dividing. The focus of this work is to analyze the conformational changes of these drugs. The method used was surface modifications using Self Assembled Monolayers (SAMs) and solvent-base screening. SAMs were prepared by modifying zinc and nickel oxide tiles in one of three organic acids: hexadecane sulfonic acid, 16-phosphonohexadecanoic acid, or n-octadecylphosphonic acid. Then, the pharmaceuticals drugs were recrystallized on the SAMs. The resulting crystals were analyzed and characterized by Reflectance Infrared Spectroscopy, Raman Spectroscopy, Powder X-Ray Diffraction, Thermogravimetric Analysis, Differential Scanning Calorimetry and Solid State Nuclear Magnetic Resonance to determine the conformational flexibility and hydrogen bonding, as these factors influence the ability of a molecule to form polymorphs.

Funding: NASA

## 70. Progress Towards the Total Synthesis of Tricyclic Alkaloid Dilemmaone B

Jeffrey McNeill (Pennsylvania)

Institution: West Virginia Wesleyan College

Field: Sciences (Chemistry)

Faculty Advisor: Bjorn Soderberg

In 1997, a group exploring the biomedical potential of South African marine invertebrates isolated three compounds from sponges found off the coast of Cape Town. Due to a number of interesting structural motifs including an indole core, and the small natural abundance of these compounds, the Söderberg group has suggested a total synthesis for one of these compounds, Dilemmaone B. Using a retrosynthetic approach, it has been proposed that Dilemmaone B can be accessed via a substituted indanone and its late-stage N-heterocyclization to create the indole core. Using both established and modified techniques, progress towards this compound has been made, and seven of the eleven proposed steps have been successfully carried out. Product formation in each step has been verified using <sup>1</sup>H-NMR, <sup>13</sup>C-NMR, IR, and MS. Yields have been calculated, and are moderate to good for each reaction after optimization. Key future work includes a Sonogashira coupling reaction and an N-heterocyclization to access the final product.

Funding: NSF

## **71. Enhancement of Heavy Metal Remediation Using Bentonite Versus Synthetic Clay**

Megan Nally (Hancock County, West Virginia)

Institution: Bethany College  
Field: Sciences (Chemistry)  
Faculty Advisor: Scott Brothers

Scientists have deduced that clay has chemical properties, such as impermeability, plasticity, and buffering ability, and a unique structure that can be used to uptake nuclear waste. Bentonite clay, specifically sodium bentonite, is used because it can expand in order to absorb heavy metals. In this specific experiment, the bentonite was used to absorb a cobalt nitrate solution. Five samples of bentonite were combined with 10mL of the solution per sample, then sample 1 was taken and centrifuged, or separated, at 5 minutes, sample 2 was taken and centrifuged at 10 minutes, etc. The absorbance of each sample was determined by using a portable visible spectrometer, which is an instrument that measures the absorbance of a colored solution. The concentration of the solution was determined by Beer's Law, which gives a relationship between absorbance and concentration. The amount of the solution absorbed can be determined using theoretical and experimental values found. Further research will include looking at a different zeolite to compare the absorption, and use different solutions to see how the absorption rates change. Determining whether bentonite or a synthetic clay better absorb heavy metals can improve remediation of waste water.

Funding: NASA West Virginia Space Grant Consortium

## **72. Modification of Zinc Oxide Nanoparticles with Perfluorophosphonic Acids**

Deben Shoup (Hancock County, West Virginia)

Institution: Marshall University

Field: Sciences (Chemistry)

Faculty Advisor: Rosalynn Quinones

Zinc oxide (ZnO) nanoparticles have semiconductive properties that can be modified to increase the performance and efficiency of solar cells. ZnO nanoparticles are inexpensive and abundant, making them ideal for use as an electron transfer layer in the structure of inverted solar cells. A relatively simple and cost efficient method of surface modification is forming self-assembled monolayers (SAMs) onto the surface of ZnO via adsorption. SAMs can greatly alter the physical and chemical properties of ZnO to make it more suitable for a wide variety of applications. The formation of perfluorinated phosphonic acids are being utilized for this project due to the highly electronegative nature of fluorine. Specifically, 12-pentafluorophenoxydodecyl phosphonic acid, 2,3,4,5,6-pentafluorobenzyl phosphonic acid, and (1H,1H,2H,2H-Heptadecafluorodec-1-yl)phosphonic acid have been used to form thin films on the ZnO nanoparticle surfaces. Fourier transform infrared spectroscopy, scanning electron microscopy with energy dispersive spectroscopy, cyclic voltammetry, electrochemical impedance spectroscopy, X-ray photoelectron spectroscopy, and ultraviolet photoelectron spectroscopy have been used to analyze and characterize the modified nanoparticles and determine the effects that each of the different phosphonic acids have on the ZnO. The perfluorinated phosphonic acid SAMs have formed strong chemically bonded films on the ZnO, and the work functions of the modified ZnO nanoparticles have been tuned due to the dipoles in the C-F bonds. The work function was found to be higher than that of unmodified ZnO which is crucial for its inclusion in inverted solar cells.

Funding:

### 73. Characterizing Lipid Production in *Chlorella Vulgaris* when Exposed to Herbicides

Amanda Smythers (Cabell County, West Virginia)

Institution: Marshall University  
Field: Sciences (Chemistry)  
Faculty Advisor: Derrick Kolling

Petroleum is the primary fuel feedstock for the transportation industry and a quickly vanishing resource. Experts believe we will reach peak oil production within three generations; in combination with rising prices and political instability in fuel-producing regions, the need for an alternative feedstock is both economically and politically apparent. Additionally, the Pentagon has listed climate change as a global security threat, increasing the need to curb greenhouse gas emissions immediately. Microalgae are photosynthetic organisms that are energy dense and grow quickly without expensive fertilizers, fresh water, or arable land. Research shows microalgae that can attain 70% oil by dry biomass could satisfy as much as 50% of the United States' transport fuel needs while using less than 2% of the 13.9 million acres used for corn-based ethanol production, without adding extra CO<sub>2</sub> to the atmosphere. In an effort to optimize *Chlorella vulgaris*, a unicellular green microalga, to have a percent oil by biomass closer to 70%, we attempted to use natural selection by exposing it to a herbicide that disables an enzyme essential for lipid (oil) synthesis. While our intention was to select for the algae with a large accumulation of the enzyme, serendipitously the results showed over 3X the lipid percent of the control after one herbicide dosage. Experiments are ongoing to characterize the mechanism of lipid accumulation under these circumstances. Since our results were consistently higher than the published maximum lipid percent for this alga, uncovering the mechanism could help engineer *C. vulgaris* for large-scale biofuel production.

Funding: NASA

#### **74. Preparation and Stability of cis-dicarbonylbis(diorganodithiocarbamato)iron(II) Complexes**

Brett Szeligo (Ohio County, West Virginia)

Institution: Wheeling Jesuit University

Field: Sciences (Chemistry)

Faculty Advisor: Jason Fuller

Iron (II) dithiocarbamate complexes are known to be especially stable; however, recent PNMR of our sample of cis-dicarbonylbis (dibenzylidithiocarbamato) iron(II) revealed, in addition to the expected peaks for the iron(II) complex, a broad peak in the range of 24 ppm. This peak corresponds to the location of the CH<sub>2</sub> peak for the corresponding paramagnetic Fe(III) complex, thus calling into question the extent of decomposition over time of the numerous other cis-dicarbonylbis(diorganodithiocarbamato)iron(II) complexes. Currently, various cis-dicarbonylbis(diorganodithiocarbamato)iron(II) complexes have been synthesized and their stability investigated using thermogravimetric analysis (TGA) PNMR, and magnetic susceptibility measurements. At ambient temperature, traces of the corresponding paramagnetic tris(diorganodithiocarbamato)iron(III) have been found for some derivatives, indicating possible room temperature decomposition of Fe(II) to Fe(III) or contamination during preparation. Parallel TGA studies have indicated a variety of paths for thermal decomposition, involving simultaneous or step-wise loss of carbon monoxide, leading to intermediates of varying thermal and kinetic stability. These observations will be discussed, along with the implications of the effect of the organic substituents.

Funding: NASA WV Space Grant Consortium

## **75. Optimizing the Reaction Conditions for the anti-Markovnikov Hydrobromination of Alkenes**

Kelly Weaver (Lewis County, West Virginia) and Tara Evans (Gilmer County, West Virginia)

Institution:      Glenville State College

Field:              Sciences (Chemistry)

Faculty Advisor: Kevin Evans

The addition of hydrobromic acid to an alkene is a fundamental organic chemistry reaction. Hydrobromic acid is a toxic gas, and therefore difficult to work with. Unsymmetrical alkenes can yield two products: Markovnikov and anti-Markovnikov alkyl bromides. Alkyl bromides are key intermediates in many organic syntheses, such as the production of new medications, polymers, and synthetic materials. The overall objective of this research is to develop a novel synthesis of the anti-Markovnikov alkyl bromide. This research is important in order to cultivate an efficient way to synthesize the anti-Markovnikov alkyl bromide, so it can be used in the production of new synthetic goods. The in situ generation of hydrobromic acid from phosphorus tribromide and water in the presence of ultraviolet radiation appears to be a viable way to synthesize the anti-Markovnikov product. The reaction of multiple alkenes with varying reaction conditions has been studied in an attempt to optimize percent conversion and percent yields. Preliminary results from these reactions are presented.

Funding: NASA WV Space Grant Consortium

## **76. Agent-Based Socioeconomic Model for the PACE Project in Monongah, West Virginia**

Benjamin Daily (Jefferson County, West Virginia)

Institution: Fairmont State University

Field: Sciences (Computer Sciences)

Faculty Advisor: Tom Devine

The Program Advancing Community Employment (PACE) is a sociological project developed by Dr. Craig White to alleviate unemployment, poverty, and poor living conditions by creating local jobs that provide beneficial services to impoverished communities. Currently in the testing phase, the PACE project requires experimental simulations to establish its viability so that it may be funded for implementation in the community of Monongah, West Virginia. This research was focused on developing a data-driven agent-based computational model to predict the future economic conditions in Monongah both with and without the planned PACE project intervention. An agent-based model evaluates the actions of each individual, or agent, using a combination of fixed rules, random components, and the limited information available to the agent about its surroundings. The results of the simulation may be used to estimate the effectiveness of the planned intervention and to test hypothetical changes to the intervention to help ensure optimum impact and chance of success. Should the model prove to have produced reasonably accurate predictions, it may be adapted and improved upon to model implementation of PACE and other economic intervention programs in communities all throughout West Virginia. The methods used to develop the model may also be useful in the advancement of research concerning the suitability of an agent-based approach for socioeconomic modelling in general.

Funding: Fairmont State University



## **77. Materials Science and Engineering Collaboration- WVU & The University of Crete (FORTH)**

Jared Beard (Monongalia County, West Virginia), Garrett Wotring (Monongalia County, West Virginia), and Chandler Williams (Kanawha County, West Virginia)

Institution: West Virginia University

Field: Sciences (Engineering)

Faculty Advisor: Konstantinos Sierros

Of importance to the continuation of scientific breakthroughs is interest in research. To this end, the National Science Foundation funded International Research Experience for Undergraduate Students (IRES) program, fosters research in a multicultural environment. The program sends 7-8 students from West Virginia University (WVU) to Heraklion, Greece, where they spend six weeks exploring the culture and conducting formal research. The project starts with a recruitment process followed by personalized training at WVU on research procedures in nanomaterials for sustainable technologies. In Greece, the students collaborate on projects to further technological development for healthy living environments at the University of Crete – FORTH Institute. Upon arrival, the students form multidisciplinary teams and interacted directly with their Greek counterparts on constructing research projects from the ground up: from literature review to final reporting. This summer's projects focused on the development and characterization of titanium dioxide and zinc oxide thin films for use as ozone gas sensors; the development of a photocatalytic titanium dioxide coating for use on the surface of structures such as walls, buildings, and monuments for air purification, self-cleaning and protection from weathering; and the development of thermochromic coatings from vanadium dioxide, which change color with temperature changes. Remarkably, this research experience has an important impact on the students because they're introduced to international networking and new ways of working with others. Furthermore, this opportunity has helped guide many of them towards graduate education programs, in turn promoting the development of younger scientists and the growth of the STEM fields.

Funding: Nation Science Foundation

## **78. Effects of the 2016 Flooding Event in WV Mosquito Populations: Implications for Vector-borne Diseases**

Jessy Blankenship (Logan County, West Virginia)

Institution: University of Charleston

Field: Sciences (Environmental Studies)

Faculty Advisor: Aida Jimenez

Vector surveillance was performed in 24 counties across the state of West Virginia to monitor for mosquito-borne diseases. Unexpectedly, a flooding event on June 23, 2016 affected some of the areas that were being monitored giving us a special chance to examine the flood effects in the different mosquito populations. After the flood, surveillance was directed towards Nicholas and Kanawha counties. Using ordination analysis, we found statistically significant differences in the types of mosquito species present before and after the flood. These changes varied among different counties. Mosquito species resistance, the amount of change in a species abundance after a disturbance, is calculated and are reported here. We also assessed the effectiveness of different mosquito traps (Light and Gravid) on their ability to attract and trap adult female mosquitoes. Since different mosquito species carry different infectious diseases, our results suggest that the effects on vector abundances may have potential implications for vector borne diseases.

Funding: WV DHHR

## 79. Leaf Angle Variability within an Oak-Hickory Forest

Christopher King (Maryland)

Institution: West Virginia University

Field: Sciences (Environmental Studies)

Faculty Advisor: Brenden McNeil

The inclination of leaves has important influences on forest physiological processes such as evapotranspiration, carbon uptake, and albedo. Variation in leaf angle is not well understood, but its physiological importance suggests it could have an underappreciated role in how forest canopies function and adapt to rapid environmental change. By mounting eight automated time-lapse cameras onto an old fire observation tower in Green Ridge State Forest, Maryland, we captured imagery useful for measuring the leaf angle phenology, or temporal variation in leaf angle observed in an oak-hickory forest. After collecting the digital images captured by the cameras each hour for five months, we used an electronic protractor to measure leaf angles on a subset of images that enabled us to characterize diurnal, daily, and seasonal trends in leaf angle variability in three species at two canopy heights. The results of this study displayed important differences in leaf angle among two oak species (*Quercus velutina* and *Quercus prinus*) and on a hickory species (*Carya tomentosa*). We observed little change in lower canopy inclinations and moderate changes toward more vertically inclined leaves later in the growing season, especially in the oak species. These empirical results further support the theory that leaf angle is a key adaption of tree species, and that it can have important and ecologically meaningful variability throughout the growing season.

Funding:

## **80. Use of Spent Horizontal Directional Drilling Mud as Soil Amendment**

John Lucas (Roane County, West Virginia)

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

Development of new technologies enables the recovery of oil and gas from previously unavailable shale deposits. Pipeline infrastructure is constructed to meet the industry demand. To avoid disruption to commerce on heavily used infrastructure (e.g. railroad, highways) or ecologically sensitive areas (wetlands, rivers, etc.) horizontal directional drilling (HDD) is used for pipeline installation. HDD allows drilling underneath such areas without disturbing the landscape. Water based sodium-bentonite mud is used in the process and is in need of disposal upon pipeline installation. Use of the spent bentonite as a soil amendment may provide cost effective means of disposal. However, high level of salts, sodium, and clay may adversely affect soil properties and fertility. Field and greenhouse studies were conducted on different soil types in order to assess the effect of spent HDD application rate (up to 88 Mg ha<sup>-1</sup>) on soil chemical and physical properties, and plant growth. Across all soil textures and application rate there was no significant change in soil cation exchange capacity, wet-aggregate stability, or crop yield. Spent HDD mud increased soil salinity. Effect on saturated-paste extractable ammonium was soil type and application rate dependent. Extractable ammonium decreased in soils of initially high N content or soils of high sand content, suggesting ammonium fixation in smectite clay interlayers added in the HDD mud.

Funding: USDA

## **81. High Tunnels: Starting from the Ground Up**

James McClain (Harrison County, West Virginia)

Institution: West Virginia University

Field: Sciences (Environmental Studies)

Faculty Advisor: Eugenia Pena-Yewtukhiw

High-tunnel food production presents an opportunity for West Virginia urban and non-urban agricultural production. High-tunnels could provide jobs and food for people throughout the year by extending the growing season into the late fall; they are structures used to protect crops from excessive weather conditions (e.g. early winter). The objective of this study was to establish a soil sampling design to better represent soil growing conditions within a high-tunnel.

Our hypothesis was that designing soil sampling taking into account crop distribution within high-tunnels will give a better representation of the overall soil fertility than conventional sampling.

The result of this study will aid in planning fertilization practices to obtain sustainable food production. The research was performed at the WVU Organic Certified Farm in a 72x26ft high-tunnel. In this structure multiple crops (e.g. tomato, carrots, strawberries, peppers) were produced in 69x3ft rows. Multiple soil cores were taken in a 3x3ft grid. The soil cores were cut into 4 depths increments (0-2in, 2-4in, 4-6in, 6-8in). The soil was dried, crushed, and analyzed for pH, lime requirement, organic matter, and bioavailable nutrients (phosphorus, sodium, potassium, calcium).

Our results indicate that depth and location of sampling will show vast differences in plant available nutrients. High-tunnel construction will affect soil characteristics with depth. A designed soil sampling scheme provides better and more informative data than conventional sampling because it takes into account crop locations and changes in bioavailable nutrients with depths, and as a consequence will guide appropriate soil management to increase and sustain production.

Funding:

## **82. AHCC in Regulation of the Immune System and Stress Hormones in a Mouse Model**

Kristin Brown (Mercer County, West Virginia)

Institution: Bluefield State College  
Field: Sciences (Immunology)  
Faculty Advisor: Tesfaye Belay

The purpose of this study was to examine the effect of the mushroom extract active hexose correlated compound (AHCC) against chlamydia genital infection and its possible role in the regulation of stress hormones in stressed mice. Oral administration of AHCC to stressed or non-stressed mice was carried out seven days before infection. During the course of infection body and spleen weights were taken. Also, cytokine production by peritoneal and splenic T cells and concentration of stress hormones in the experimental groups was determined by ELISA. Levels of tumor necrosis factor-alpha (TNF- $\alpha$ ) and interleukin 6 (IL-6) were significantly increased in stressed mice receiving AHCC compared to stressed mice receiving PBS. Production of interferon gamma (IFN- $\gamma$ ) and interleukin 2 (IL-2) in the AHCC group was significantly high compared to production in PBS-fed group. AHCC-fed stressed mice presented a substantial weight gain compared to control. Plasma level of epinephrine and norepinephrine were significantly reduced in stressed AHCC-fed mice compared to stressed PBS-fed mice. Results obtained in this study show that AHCC feeding improves the function of immune cells and reduces stress hormone levels. However, further investigation on the action of AHCC in the regulation of the immune system and stress hormone production in mice is underway in our laboratory.

Funding: NIH

### **83. Minimal Noise-Induced Stabilization of One-Dimensional Diffusions**

Tony Allen (Putnam County, West Virginia), Emily Gebhardt, and Adam Kluball

Institution: West Virginia University

Field: Sciences (Mathematics)

Faculty Advisor: Tiffany Kolba

The phenomenon of noise-induced stabilization occurs when an unstable deterministic system of ordinary differential equations is stabilized by the addition of randomness into the system. The occurrence of noise-induced stabilization is quite surprising and intriguing as one's first intuition is that randomness will only serve to further destabilize system. However, it is often the case that the more randomness present, the stronger the stabilizing effect. We investigate under what conditions one-dimensional, autonomous stochastic differential equations are stable. There are many different notions of stability used in literature, but we take the notion of stability to be that of global stochastic boundedness. We find necessary and sufficient conditions for noise-induced stabilization to occur when the drift and noise coefficients are restricted to specific forms. Specifically, we find the minimum amount of noise necessary for noise-induced stabilization to occur when the drift and noise coefficients are power, polynomial, exponential, or logarithmic functions.

Funding: National Science Foundation

#### **84. Patrol Zone Realignment for the Huntington, WV Police Department**

Kevin McDaniel (in place of Sara Brumbaugh), Elizabeth Hance, and David Jones

Institution: Marshall University

Field: Sciences (Mathematics)

Faculty Advisor: Michael Schroeder

The Huntington Police Department patrol zones have, due to changes in crime distribution and the makeup of the department, become ineffective over the last 14 years. We analyzed data and looked for trends from 2004 to 2014. To create better zones, we began by creating several naïve maps, or maps drawn by hand using human intuition and data analysis, with anywhere from six to ten zones. These maps were then optimized using a mathematical technique called gradient descent. The naïve maps were tested, and optimized maps were found by measuring them using a fitness function. We mimic the overall patrol patterns of an officer using a discrete event simulation, which measures the workload distribution and response time. The effectiveness of each plan were further evaluated using the listed methods, and we communicated our results and suggestions to the police department. In our poster presentation, we will present our methods and findings.

Funding: MAA, NSF, and SIAM



## 85. Completing Partial Latin Squares Arising from Latin Arrays

Sarah Gustafson (Harrison County, West Virginia), Stacie Baumann (Ohio), and Kevin Akers (Mercer County, West Virginia)

Institution: Davis and Elkins College  
Field: Sciences (Mathematics)  
Faculty Advisor: Michael Schroeder

A Latin Square is a gridded square with a symbol appearing once in every row and in every column. A partial Latin Square is an incomplete Latin Square because many rows and columns do not contain a symbol. The question about what conditions allow for partial Latin squares to be completed has been studied since the 1940s. Recently, Kuhl and Schroeder looked at a specific problem where an  $r \times r$  Latin array  $A$  is copied  $n$  times down the diagonal of a blank array. Call this resulting partial Latin square  $nA$ . In 2015, they proved that if  $n > r$ , then  $nA$  is completable for any  $r \times r$  Latin array  $A$ , and if  $n < r$ , there exists an  $r \times r$  Latin array  $A$  such that  $nA$  is not completable. They failed to resolve the case when  $n = r$ . At the Summer 2016 Marshall University REU, we improved upon their techniques. In this work, we show that  $rA$  is completable for every  $r \times r$  Latin array  $A$ .

Funding: National Security Agency

## 86. Characteristics of certain Polynomials in the P-adic Numbers and their Roots

Isaac Johnson (Upshur County, West Virginia)

Institution: West Virginia Wesleyan College

Field: Sciences (Mathematics)

Faculty Advisor: Scott Zinzer

My research began with attempting to find a process of finding p-adic roots of polynomials similar to Hensel's Lemma. Hensel's Lemma and Newton's Method have similar applications, except in the P-adic field. The original research idea was prompted by the fact that Hensel's Lemma does not hold when the derivative of the polynomial is  $0 \pmod p$  where  $p$  is a prime number. This led me to investigating polynomials of the form  $x^n+1$  which fail Hensel's Lemma when  $n$  equals the chosen prime. I explored the characteristics of this style of polynomial with varying values of  $n$  and various prime values. This led to the conjecture that polynomials of the form  $x^n+1$  have  $n$  roots if and only if the prime is of the form  $2ns+1$  where  $n$  is a prime integer and  $s$  is a natural number. I proved this conjecture through application of Lagrange theorem and exploitation of the multiplicative group structure of the integers modulo  $n$ . These polynomials also have other structural properties that will be explored in the presentation.

Funding:

## **87. Identification of Plant and Fungal Extracts that Exhibit Antimicrobial Activity against Pathogenic Bacteria**

Caleb Martin (Kanawha County, West Virginia)

Institution: West Liberty University

Field: Sciences (Microbiology)

Faculty Advisor: Joseph Horzempa

According to the Centers for Disease Control and Prevention, there have been more than 2 million people infected with drug-resistant bacteria in the USA resulting in over 23,000 deaths in the past year. The development of new antibiotics and therapies that target pathogenic microbes is critical for preventing mortality caused by drug-resistant bacteria. We previously discovered that extracts of *Rhamnus purshiana* (bark), *Eupenicillium parvum* (fungus), and *Arctostaphylos uva ursi* (leaves) exhibit novel antimicrobial activity toward *Staphylococcus aureus*. We next wanted to determine whether these extracts would inhibit the growth of other pathogenic bacteria. These extracts were screened against a variety of gram-positive and gram-negative bacteria. *Rhamnus purshiana* was selected for use against *Acinetobacter baumannii* in vivo using a *Galleria mellonella* infection model. *Rhamnus purshiana*, *Eupenicillium parvum*, and *Arctostaphylos uva ursi* exhibited substantial antimicrobial effects against *Acinetobacter baumannii* and *Escherichia coli* in vitro. Using the *Galleria mellonella* larvae *A. baumannii* infection model, *Rhamnus purshiana* extract prolonged host survival suggesting that this extract shows promise as a future therapeutic. Bio-assay guided fractionation is being utilized to separate and elucidate the active compound within these three natural products in an attempt to further the characterization and identification of potential new therapeutics.

Funding: NIH

## 88. Growth and Structural Characterization of Iron Fluoride

Rebecca Davis (Pennsylvania)

Institution: West Virginia Wesleyan College

Field: Sciences (Physics)

Faculty Advisor: David Lederman

Growth and structural characterization of iron fluoride Becca Davis<sup>1</sup>, Amit KC<sup>2</sup>, Toyonath Joshi<sup>2</sup>, Pavel Borisov<sup>2</sup>, David Lederman<sup>2</sup> West Virginia Wesleyan College<sup>1</sup>, West Virginia University<sup>2</sup> Morgantown, WV 26506. My goal was to successfully synthesize epitaxial Iron Fluoride films of two different crystalline orientations, with a thickness ranging between 40nm to 60nm and a mean film roughness of less than 1nm. These objectives had to be met in order for the films to be forwarded to Rutgers University for further research, related to novel designs of electric batteries made of the advanced new material Iron Fluoride. This research will aid in the advancement of battery applications to allow for more efficient charge transport. (110) and (001) oriented Iron Fluoride films were grown on Magnesium Fluoride substrates via Molecular Beam Epitaxy (MBE) technique. Reflection high energy electron diffraction (RHEED) was used for in-situ characterization of thin film and single crystal substrate surfaces. X-ray diffraction (XRD) and x-ray reflectometry (XRR) were also used to characterize the thin films in terms of crystal structure, film thickness and roughness. The smallest mean film roughness for each sample included (001) with 1.764nm and (110) with 0.999nm. Future endeavors would include growing more samples with a roughness under 1nm.

Funding: National Science Foundation

## **89. The Effects of Changes in Reinforcer Magnitude in Resurgence**

Matthew Klocke (Monongalia County, West Virginia)

Institution: West Virginia University

Field: Sciences (Psychology)

Faculty Advisor: Andy Lattal

Traditionally, resurgence is defined as the recurrence of behavior following a period of non-reinforcement in which an alternative response is trained and then subsequently extinguished. Although resurgence is typically examined in contexts in which the alternative response is extinguished, there is some preliminary evidence to suggest that resurgence will occur in the absence of extinction. The current experiment is a further examination of the conditions under which resurgence will occur by examining the effects of a reduction in reinforcer magnitude on resurgence. During the resurgence test, the reinforcer magnitude was reduced from 4 pellets in the alternative phase to 1 pellet and resurgence was observed for all four rats. This indicates that other parameters of reinforcement, aside from extinction, may evoke resurgence. Additionally, this experiment provides support of the notion that a general worsening of conditions associated with the alternative response, other than extinction, may be sufficient for producing resurgence.

Funding:

## **90. A Study of Ceramics in Coal Company Towns**

Kristopher Collins (Wood County, West Virginia)

Institution: Marshall University

Field: Social Sciences (Anthropology)

Faculty Advisor: Nick Freidin

Excavations were carried out in 2015 and 2016 at Tams, WV and Wyco, West Virginia as part of the Coal Heritage Archaeology Project. This work focused on the residential portions of these towns, and the people who had once lived there. Both Tams and Wyco originated as coal company Towns in the state in West Virginia and were owned by WP Tams, Jr, who lived from the 19th of May until August 3rd of 1977 and was known to be one of the final Coal barons. All residents both worked for, and paid rent to the coal companies that Mr. Tams owned. These communities were physically isolated, and many residents could only purchase goods at the company store. This poster will examine the ceramic materials recovered across the segregated communities at Tams and Wyco to develop a better understanding of race and class in early 20th century coal company towns.

Funding:

## **SOCIAL SCIENCES**

### **91. The Emergence of Public Relations and how it has Changed Presidential Campaign Strategies**

Clara Maynard (Logan County)

Institution: Marshall University

Field: Social Sciences (Communications/Journalism)

Faculty Advisor: Arthur Damien

Presidential campaigns have changed drastically over the course of 50 years to focus on how a candidate is received. In early campaigns it would have been extremely rare for a candidate to appear on the trail, whereas today it would be detrimental for one to not. In fact, perhaps the most important part of a campaign is the image the candidate portrays to the American public. In a world where the 24-hour news cycle dominates public opinion many scandals and gaffes that would have been highly criticized in early presidential campaigns are hardly remembered for more than a day. The development of public relations as a field has shifted presidential campaigns to focus more on strategic communications tactics and less on the actual candidate's ideology. It is no longer about who is a better president, but as James Bryce foreshadowed in "Why Great Men Are Chosen Presidents,": "Now to a party it is more important that its nominee should be a good candidate than that he should turn out a good president. A nearer danger is a greater danger."

Funding:

## **92. A Life Not Your Own**

Ashton McKinney (Fayette County, West Virginia)

Institution: West Virginia University

Field: Social Sciences (English)

Faculty Advisor: Dennis Allen

This work takes a look at the graphic novel "Fun Home" and specifically the controlling nature of the main character Alison's father Bruce. From there I look at the larger social implications of having a parent like this and the way in which it can both harm and benefit the child. Parents who steal the show from their children often leave those children unfulfilled and living a life that was planned for them and not their own. I have also pulled a few resources from the field of psychology to help aid my research on these behaviors and later life development. The book itself and the abstract will also touch on LGBTQ+ themes and how they play into the conflict between Alison and Bruce. Overall the aim of this abstract is to relate the classic binary conflict between parent and child in "Fun Home" to all parents and children in a fun way that everyone can understand.

Funding:



### **93. Looking inside Russia's Intervention in Ukraine: Implications for U.S. National Security**

Brian Miller (Hancock County, West Virginia), Jeffery Pritt (Berkeley County, West Virginia), and Justin Richter (Harrison County, West Virginia)

Institution: Fairmont State University

Field: International Studies

Faculty Advisor: Todd Clarke

In 2016, Fairmont State University's Open-Source Intelligence Exchange (OSIX) Laboratory has been examining economic, military, political and social conditions in the eastern Ukrainian city of Donetsk. These areas demonstrate a barometer of the effectiveness of Russia's new form of unconventional warfare, which Moscow calls "strategy of indirect action." OSIX undergraduate analysts anticipate this strategy will form the blueprint for Russian attempts to destabilize U.S. partners within the North Atlantic Treaty Organization (NATO) that U.S. forces – to include Reserve Components and National Guard Units based in West Virginia – are obliged to defend against external aggression. Leveraging corporate and private donations with a matching grant from the state of West Virginia for a total of \$200,000, the OSIX Lab utilized a portion of this funding to analyze conditions in eastern Ukraine's largest city using a variety of open-source analytic techniques, to include analysis of social media, geographic information system data, foreign-language news publications and military order-of-battle databases. These techniques are woefully underutilized within the U.S. Intelligence Community. This research effort has resulted in clear, concise analysis provided to U.S. Government customers to influence policy deliberations within the National Security Council, the Department of Defense and the Department of State. OSIX's efforts to pioneer new open-source analytic techniques are putting Fairmont State University—and West Virginia—on the cutting edge of a dynamic field that has the potential to create significant new opportunities for job growth and economic development in the state.

Funding: West Virginia Research Trust Fund, Stem Grant Program

## **94. Escalating Child Welfare Costs in West Virginia and Federal Funding**

Kelli Chattin (Kanawha County, West Virginia)

Institution: University of Charleston

Field: Social Sciences (Political Science)

Faculty Advisor: Hallie Dunlap

As the number of children in foster care rises, the costs of care and services increases for West Virginians. In 2010, West Virginia ensured care for 4,097 children through the Bureau for Children and Families. As of September 2016, approximately 4,900 children were placed in care costing the state \$19.73 per child, per day. On average, one child in foster care costs \$600 per month and \$7,200 per year, at minimum. Additionally, the government must provide \$300 for emergency clothing upon entrance to foster care and \$200 for school clothing annually (Child Trends, 2015). Including these additional expenses, the cost per child is raised to \$7,700 for one year, and this still excludes supplementary costs of transportation, staff-time, and personal health care. My analysis will examine the cost distribution and program expense in West Virginia's foster care system compared to the national average, and will further examine potential contributing factors in observed cost differences. Through a comparative case study of West Virginia and the United States, I will examine the differences in state and federal spending patterns over a period of five years. The primary measures I will consider are: out-of-home placement, in-home preventative services, adoption and legal guardianship, child protective services, and assistance for older youth. West Virginia spends 65% of its federal money on out-of-home placements compared to the national average of 46% (Child Welfare Financing, 2015). Preliminary data suggests that this disparity is a reflection of the increased number of children entering the WV foster care system.

Funding:

## **95. Religion's Influence on the American Presidency**

Nancy Peyton (Logan County, West Virginia)

Institution: Marshall University

Field: Social Sciences (Political Science)

Faculty Advisor: Damien Arthur

Article VI of the Constitution clearly states, “no religious Test shall ever be required as a Qualification to any Office or public Trust under the United States.” During every election season, dating back as far as the very beginning of our nation, religion has been directly tied into politics by the American people. Religion seems to be a deciding factor on whether the public views a president as “fit to lead” both during their campaign and their actual presidency. All presidential candidates are put through an unofficial religious test. From the moment that a candidate becomes a part of the political scene, their words and actions are scrutinized to see if they live up to the faith that they claim. This research focuses on three case studies - Thomas Jefferson, John F. Kennedy, and Barack Obama - to observe that, while religion does influence the decision-making of most individuals of faith, the religion of a man has no real bearing on their ability to serve as president. This research also explores how presidential candidates react when their faith is questioned or scrutinized.

Funding:

## **96. And for the Sake of Justice: An Analysis of the 2004 Judicial Elections**

Caleb Turner (Putnam County, West Virginia)

Institution: University of Charleston

Field: Social Sciences (Political Science)

Faculty Advisor: Kara Fisher

In recent years, the ideas of judicial fairness and impartiality have come into question with the rising financial and political involvement of pro-business and tort reform advocacy groups in state judicial elections. In 2004, judicial elections across the United States witnessed unprecedented levels of spending as special interest groups and judicial campaign committees spent millions of dollars to elect their candidates to high courts. Among these races, both West Virginia and Illinois saw outside, independent groups flood their airways in support or opposition to a particular candidate. My research examines the 2004 Illinois and West Virginia Supreme Court races, in which pro-business and tort reform groups devoted significant funds to electing favorable justices. The purpose of this research is to detail the proliferation of spending and determine the potential relationship to the outcome of the 2004 judicial elections. I use data collected by the Center for Responsive Politics and campaign finance expenditures reported by the Illinois and West Virginia Secretary of State's offices. My project focuses on a comparative analysis of the 2004 Illinois and West Virginia Supreme Court races in a case study design. I compare measures of interest group involvement from pro-business and tort reform groups, as well as legal groups and organized labor unions. Preliminary analysis suggests that a relationship exists between interest groups financial contributions in these targeted areas and judicial elections. In an era of growing distrust in government, the results of my study will show an example of financial influence in competitive judicial races.

Funding:

## **97. How Presidents' Stance on Poverty Has Changed Before and After FDR**

Chelsea Wallen (Raleigh County, West Virginia)

Institution: Marshall University

Field: Social Sciences (Political Science)

Faculty Advisor: Damien Arthur

Although poverty is a significant concern now, most presidents before Franklin D. Roosevelt did not believe it was of importance. Because so many Americans were living in poverty due to the Great Depression, FDR introduced the idea of focusing on poverty and how to stabilize it. However, these ideas continued to exist in presidents thereafter even though the Great Depression had ended. Comparing Coolidge and Hoover to Truman and Eisenhower, their stances and tones in their speeches discussing poverty varied tremendously because of its importance after the Great Depression. Unemployment rates rose during this time, fell once Roosevelt took office, and rose slightly during Reagan's term. Poverty has remained a popular matter for politicians to discuss even though the poverty rate in 2015 has declined tremendously compared to the poverty rate in the 1920s. Overall, Roosevelt's ideas and policies for eradicating poverty continued with Johnson's presidency and even into the 21st century.

Funding:

## **98. A Scale of Partner Addiction: Underlying Mechanisms in Insecure Attachments and Clinical Issues**

Shakira Bowman (Kanawha County, West Virginia)

Institution: Marshall University  
Field: Social Sciences (Psychology)  
Faculty Advisor: Marc Lindberg

Introduction: Relationship problems stand out in West Virginia as significant issues underlying the development of psychological problems such as substance abuse, partner abuse, obesity, personality disorders etc. Therefore it is very important to understand why and how many relationships lead to these kinds of psychological disorders as they are costing the state a great deal of money. One thing that might serve as an underlying cause of many suffering from these conditions might involve aberrant personal relationships in the form of partner addictions. Recent research has suggested that romantic relationships could take on addictive elements (Earp, Wudarczy, Foddy & Savulescu, 2014). The purpose of this study was to develop a scale of Partner Addiction that could demonstrate identify the developmental precursors to such an addiction as well as their role in creating related problems.

Methods: Volunteer undergraduate students ( $n = 491$ ) completed a variety of scales and measures, including the Attachment and Clinical Issues Questionnaire (ACIQ), the CAGE measure of alcohol abuse and DCAGE measure of drug abuse, two tests of borderline personality disorder, measures of partner abuse, and the (ACE).

Results: The partner addiction scale had good psychometric properties, with a coefficient alpha = .87. Significant correlations were found between the partner addiction scale and psychological, physical, and sexual abuse while growing up as well as most other forms of psychopathology.

Discussion: These results demonstrated the ability of the partner addiction scales to predict a plethora of clinically relevant symptomology, therefore suggesting new paths to treatment.

Funding:

## 99. A Breath of Fresh Air: Smoking Status and Lung Capacity Analysis

Moriah Chicoine (Hancock County, West Virginia) and Haley Kleinedler (Ohio County, West Virginia)

Institution: West Liberty University

Field: Social Sciences (Psychology)

Faculty Advisor: Tifani Fletcher

Many ill health effects are associated with cigarette use. Electronic smoking devices are becoming more commonly used in conjunction with, or as an alternative to, cigarette smoking. This study was designed to analyze the lung capacities of non-smokers, smokers, and electronic smoking device users (vapors). Forty-five participants (23 female) were recruited using convenience and snowball sampling (12 cigarette smokers, 12 vapors, 6 smokers & vapors, 15 non-smokers). An inexpensive procedure for measuring lung capacity by blowing into a balloon was used to determine lung capacity in lieu of spirometry. The participant's actual lung capacity was found by converting the diameter of the blown up balloon, the highest of three attempts, into cubic centimeters using a conversion graph. The Mosteller formula was then used to calculate the expected lung capacity, which accounts for both gender, height, and body size. Surprisingly, the smokers & vapors group ( $M = 74\%$ ,  $SD = 27.4$ ) had the highest percentage of lung capacity, compared to non-smokers ( $M = 68\%$ ,  $SD = 20.5$ ) even when controlling for age, however, the differences between groups were not statistically significant,  $F(3, 41) = 0.11$ ,  $p > .05$ . Non-smokers were, on average, younger than the other groups, which may have been due to sampling. While the results indicate that vaping is related to increased lung capacity, this study did not examine health effects associated with smoking status. Other variables, such as frequency and brand should also be considered. It is suggested that this study is replicated using alternate sampling techniques with a larger sample size.

## **100. Examining the Association between Unhealthy Eating Behaviors and Depressive Symptoms in Adolescence**

Brooke Cottrill (Harrison County, West Virginia)

Institution: West Virginia University

Field: Social Sciences (Psychology)

Faculty Advisor: Aaron Metzger

Depression and mood disorders have devastating and pervasive effects (Brausch & Decker, 2013). Adolescence is a particularly sensitive time period for depressive symptoms, which typically increase from childhood (Nolen-Hoeksema & Girgus, 1994). Depression is a particularly serious issue in West Virginia, as 14.3 percent of citizens suffered from depression in 2010 (Centers for Disease Control and Prevention, 2010). Poor body image (Blashill & Wilhelm, 2013; Hamlat et al., 2015) and disordered eating (Brausch & Decker, 2013) are often linked to depressive symptoms, especially in adolescence. There is further evidence to suggest that consuming fast food and junk food may also be associated with increased depressive symptoms (Chang, Brown, & Nitzke, 2016; Jacka et al., 2010). As obesity is highly prevalent in West Virginia (Centers for Disease Control and Prevention, 2010), examination of unhealthy eating habits and depression is increasingly paramount. The current study seeks to examine the association between unhealthy food choices and depressive symptoms in adolescence. It is hypothesized that unhealthy eating behaviors will be associated with higher levels of depressive symptoms in adolescents. It is further hypothesized that this association will be exacerbated for females and overweight adolescents. The sample consisted of 161 adolescents (59.6% female, 80.7% Caucasian) from a rural area of a Mid-Atlantic state. Participants ranged in age from 12-18 (Mage = 14.42, SD = 1.73) and 72.7% received at least As or Bs in school. Parents' level of education reflected that 67.0% of mothers and 52.2% of fathers earned least a college education.

Funding:



## **101. A Review on Efficacy versus Effectiveness in Parent-Child Interaction Therapy**

Cassandra Drain (Virginia), Hannah Coffey (Berkeley County, West Virginia), and Emma Veshecco (Pennsylvania)

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

Parent-Child Interaction Therapy (PCIT) is an evidence-based intervention used with children 2-7 years old with disruptive behavior problems (Eyberg & Robinson, 1982; McNeil & Hembree-Kigin, 2010). There are several studies that look at the efficacy or the effectiveness of PCIT, but not comparatively. Studies focusing on the efficacy of PCIT look at PCIT in a laboratory setting with clinical psychology doctoral students as therapists, pre-post treatments designs, and more exclusive criteria for participants (Stokes, J., 2014). Studies focusing on the effectiveness of PCIT look at PCIT in a community mental health center or home setting, with master's level therapists, and with less exclusion criteria for participants (Stokes, J., 2014). This review looks at studies that have assessed the efficacy of PCIT as well as studies that have assessed the effectiveness of PCIT, and compares their conclusions to clarify whether the intervention program works as well in the real world as it does in a clinical setting. This review has implications on how PCIT can be adapted in the real world for those who do not have accessibility to a clinical setting, as well as the cost effectiveness of implementing PCIT.

Funding:

## **102. The Effects of Divorce on Children Based on Age and Gender**

Lacee Emery (Cabell County, West Virginia)

Institution: Marshall University

Field: Social Sciences (Psychology)

Faculty Advisor: Marc Lindberg

**Problem Statement:** According to the Center of Disease Control, the divorce rate for West Virginia in 2014 was one of the highest in the United States. Two studies were conducted to investigate relationships between parental divorce and attachments and clinical issues. **Methods:** In Study 1, 92 children aged 13-15, 181 children aged 16-17, and 229 children aged 18-21 served as participants. In Study 2, 407 college students were tested. The Attachment and Clinical Issues Questionnaire (ACIQ) was administered to all groups. **Results:** In Study 1, differences in attachment patterns toward mother, father and partner were found along with differences in the following clinical issues: anger, denial of feelings, family suppression of feelings, perfectionism, sexual intimacy, mistrust, and shame where younger adolescent females were more affected. In Study 2 with older college students, the large effects were not observed. **Discussion:** Study 1 showed that the effects of divorce are fairly temporary, and age specific. Furthermore, the effects were found to be mediated by attachments to parents rather than to divorce per se. Study 2 pointed to the importance of developmental differences in relationships and the plasticity of their formation showing that early experience does not “fix” or “stamp in” certain characteristics. This is important because it shows how adolescents tend to recover from clinical issues in the natural world, and potential ways to deal with them in clinical populations.

**Funding:**

### **103. Development and Validation of the Approval Seeking Inventory**

Kelsey Frank (Fayette County, West Virginia)

Institution: West Virginia Institute of Technology

Field: Social Sciences (Psychology)

Faculty Advisor: Cynthia Hall

The author-developed Approval Seeking Inventory (ASI) was designed to assess the degree to which young adults engage in approval seeking behaviors. Approval seeking can be defined as exhibiting socially desirable behaviors in order to get approval from others and gain social acceptance or achievement. Like social desirability, approval seeking may be driven by self-presentation and the goal of being perceived positively by others. However, approval seeking may be distinct as the goal may not be to be perceived positively, but to adjust behavior to be accepted by others (which could include undesirable behaviors). A principal components analysis using a varimax rotation was conducted to reduce the original 54 items down to 6 items which comprise the final instrument and explain 70.52% of the variance. Cronbach's alpha, a measure of internal consistency, was .80. The Approval Seeking Inventory was convergent with measures of social desirability and self-monitoring and divergent from the personality trait of agreeableness. Overall the Approval Seeking Inventory demonstrated strong internal consistency, structural validity, and external validity.

Funding:

#### **104. Terrorism Perspectives: Impact of Language on Perception**

Hannah Barton (Kanawha County, West Virginia) and Thomas Brooke (Kanawha County, West Virginia)

Institution: University of Charleston

Field: Social Sciences (Psychology)

Faculty Advisor: Michael Bayly

This study will examine how language influences our perceptions of events. News frames are the words and images that surround an event and ultimately determine the representation of the event the audience absorbs, and are an important aspect of modern media (Barber, 1996). During our study, participants will be randomly assigned to be read one of three reporting frames (narrations). Following the assigned narration, all participants will watch the same video of a non-graphic, airplane incident. Participants will then answer a questionnaire that is designed to evaluate their perceptions of the event. Our independent variable is the narration, which breaks down into three types: The first describes the incident as a terrorism event; the second describes the incident as a mechanical failure; the third describes the incident in neutral terms, and will serve as our control group. The follow-up questionnaire will contain our dependent measures, including assessments of perceptions the event was due to terrorism, accident, or other factors. All measures will be taken on five-point Likert-type scales. We expect that the results will indicate perceptions are directly influenced by the descriptive language surrounding the event. This study, and others like it, are critical for explaining how the media manipulates our thoughts pertaining to events that occur. We hope to shed light on how easy it is for the media to control how the public perceives significant news. This could be used to encourage individuals to think more deeply about information they have been exposed to before forming opinions.

Funding:

## **105. The Halo Effect: The Effect of Physical Appearance on General Impression Formation**

Casey Hogg (Mason County, West Virginia) and Haley Harper (Hancock County, West Virginia)

Institution: West Virginia Institute of Technology

Field: Social Sciences (Psychology)

Faculty Advisor: Cynthia Hall

The present study further examines the halo effect based on the ways that appearance can influence other, unknown, aspects of a person's character, it will also attempt to confirm the babyface stereotype. The halo effect occurs when one aspect of an individual is seen positively other aspects of the same individual tend to be viewed positively as well. There have been numerous studies conducted to examine the halo effect. However, very few of these have examined how the physical appearance of a speaker will affect the overall positive or negative impression of said speaker and, there have also been very few experiments conducted to examine the halo effect in a live, non-recorded speech or lecture format which this experiment attempts to correct. Students from two classes will be used as participants. Each class hosted the guest speaker to give a short lecture. In one class the speaker was well dressed and in the other class the speaker appeared unkempt. The lectures were identical so that different judgements cannot be drawn from the speech itself and only from the speaker's appearance to further demonstrate that physical appearance and intelligence are highly correlated. It is expected that the speaker that is well dressed will be rated as having many other positive characteristics and the guest speaker whose physical appearance is less pleasing (more unkempt), will thus have more negative characteristics. Data collection was completed November 15. Although, analyses are not complete, preliminary investigation supports the hypotheses.

Funding:

## **106. The Association between Personality and Self-Esteem**

Mark Magallanes (Arizona) and Emily McCormick (Kanawha County, West Virginia)

Institution: West Virginia Institute of Technology

Field: Social Sciences (Psychology)

Faculty Advisor: Cynthia Hall

Surprisingly, little research has examined the association between personality traits and self-esteem. Because personality is considered to be somewhat heritable, it is possible that certain types of people may be predisposed to have higher self-esteem. Previous research has found that individuals with high self-esteem also tend to have high conscientiousness, high openness, high agreeableness, high extraversion, and low neuroticism/emotional stability. However, when accounting for all traits at the same time, only extraversion, agreeableness and neuroticism predict self-esteem. There is some conflict regarding the relationship of extraversion; some research has identified low extraversion as a predictor of high self-esteem. The present study sought to examine the relationship between personality traits and self-esteem with the hope of further investigating the inconsistent relationship between several variables. Participants included 99 undergraduate students who completed a battery of questionnaires including a measure of personality traits, self-esteem, and social desirability. Results indicate that high self-esteem is associated with low extraversion, low conscientiousness, greater neuroticism, and low social desirability. A simultaneous multiple regression examined these 4 variables as possible predictors of self-esteem. Results identified only low conscientiousness and greater neuroticism as predictors of self-esteem.

Funding:

## **107. The Attachments and Clinical Issues of Male and Female Abusers in Intimate Partner Violence**

Landon Marcum (Wayne County, West Virginia)

Institution: Marshall University

Field: Social Sciences (Psychology)

Faculty Advisor: Marc Lindberg

**Purpose:** According to the National Intimate Partner and Sexual Violence Survey (2010), the lifetime prevalence of partner abuse (IPV) is higher in West Virginia than in any other state. In addition to the fact that IPV leads to direct physical and psychological damage to the victims, it also appears to contribute to depression and suicidal behavior, as well as alcohol, tobacco, and other drug abuse (World Health Organization, 2013). The purpose of this study is to examine potential causes of IPV in terms of insecure attachments and clinical issues. **Methods:** A sample of 480 participants completed the 29 scales of the Attachment and Clinical Issues Questionnaire, (ACIQ), the Adverse Childhood Events questionnaire (ACE), and measures of partner addiction, and measures of their own substance abuse. **Results:** There were significant correlations between the three types of IPV (physical, emotional, and sexual) and the clinical issues of anger, shame, jealousy, and control. Further, IPV correlated significantly with the insecure attachment, and partner addiction scales. **Discussion:** This study found that IPV in both males and females correlated significantly with clinical issues and insecure attachments with mother, father, and partner. This leads to the testable new hypothesis that therapies that target these aspects of victims could be effective in reducing the possibility of victims returning to their abusers as well as reduce their suffering.

**Funding:**

## **108. The Effect of Long-Distance College Relationships on Grades and Subjective Well-Being**

Brittan McClain (Kanawha County, West Virginia) and Lindsey Harless (Lincoln County, West Virginia)

Institution: West Virginia Institute of Technology

Field: Social Sciences (Psychology)

Faculty Advisor: Cynthia Hall

The current study examines the effect undergraduate college students' relationship status and the effects that the geographic closeness of these relationships have on the student's overall well-being. This study investigates the level of stress on the student, their overall subjective well-being, fluctuations in their GPA, and their involvement on campus. Participants included students in long distance romantic relationships, geographically close romantic relationships, and students that are single. Previous studies have concentrated on the proportion of students in long distance relationships, but the present study addresses the affects relationships have on the students pertaining to their emotional and psychological state. Long distance romantic relationships (LDRRs) are very prevalent in college students. As many as 75% of college students report being in an LDRR at some point in their college career. This distance can be very difficult for the students, inducing stress onto the individual and degrading their subjective well-being. Evidence from previous research is also inconsistent with whether or not geographically close romantic relationships (GCRRs) lead to more relational satisfaction (e.g. overall subjective well-being in a relationship) than LDRRs. It is expected that students in long distance relationships will demonstrate less campus involvement, have lower GPAs, lower psychological well-being, and greater stress compared to both students in GCRR and students who are single. Data collection is underway and will be completed before the end of the current semester.

Funding:



## **109. Personality Predictors of Social Desirability**

Emily McCormick (Kanawha County, West Virginia) and Mark Magallanes (Arizona)

Institution: West Virginia Institute of Technology

Field: Social Sciences (Psychology)

Faculty Advisor: Cynthia Hall

The present study examined whether the presence of certain personality traits (i.e., extraversion, agreeableness, conscientiousness, neuroticism, openness, and self-monitoring) were associated with and predictive of socially desirable responding. Historically, it has been assumed that social desirability leads to inaccurate responding on personality inventories in order to “fake good” or “fake bad”. Because personality traits are to some degree genetic or heritable, the present study took a different approach and investigated personality traits as predictors of social desirability. This approach is unique in that no previous research has conceptualized traits as leading to socially desirable responses (white lies or exaggerations to appear in a more positive light). An extensive review of previous research resulted in articles solely utilizing social desirability as an indicator of inaccurate responding on personality inventories; no articles were found investigating the reverse relationship possibility. Results of the present study suggest greater agreeableness and conscientiousness and lower neuroticism and self-monitoring were associated with greater social desirability. Significant personality variables were then examined as predictors of social desirability. Greater agreeableness, lower self-monitoring, and marginally lower neuroticism predicted social desirability. Implications suggest that personality may predict socially desirable responding.

Funding:

## **110. Integration Based Stress Removal Therapy and Perceived Stress Levels**

Kelly Slobodian (Pennsylvania) and Moriah Chicoine (Hancock County, West Virginia)

Institution: West Liberty University

Field: Social Sciences (Psychology)

Faculty Advisor: Tifani Fletcher

Integration Based Stress Removal (IBSR) is a somatic based therapy designed to access the gut brain, autonomic nervous system, and central nervous system, causing the autonomic stress response to become more regulated. As a relatively new therapy, which can be combined with EMDR, more research is needed on IBSR. Existing client information collected by trained IBSR therapists (n= 440) was analyzed for this study. Using the Perceived Stress Scale, paired samples t-tests indicated a significant decrease in perceived stress scores from the pretest to the posttest for both versions of the PSS given (PSS-10 pretest M= 23.3, SD= 7.7, PSS-10 posttest M= 14.61, SD= 6.44,  $t(45)= 9.45$ ,  $p< .001$ ; PSS-14 pretest M= 33.27, SD= 9.76, PSS-14 posttest M= 22.88, SD= 9.10,  $t(25)= 5.833$ ,  $p< .001$ . Clients who completed the IBSR-EMDR hybrid therapy showed a significant increase in Validity of Cognition scores from pretest (M= 3.14, SD= 1.88) to posttest (M= 5.48, SD= 1.88),  $t(24), -4.34$ ,  $p< .001$ . Additionally, the IBSR-EMDR clients that completed the Subjective Units of Distress Scale showed a significant decrease in scores from pretest (M= 8.73, SD= 2.57) to posttest (M= 4.36, SD= 2.65),  $t(21)= 5.85$ ,  $p< .001$ . Overall, results indicated a reduction in self-reported negative symptoms, and an increase in self-reported positive symptoms for both the IBSR and IBSR-EMDR therapies. Based on suggestions by the researchers, the founder of the IBSR therapy is in the process of collecting longitudinal data, with the intent of incorporating and encouraging more standardized data collection procedures with other IBSR therapists.

Funding:

## 111. Investigation of the Relationship between Psychopathy and Personality Traits

Lesli Taylor (Kanawha County, West Virginia)

Institution: West Virginia Institute of Technology

Field: Social Sciences (Psychology)

Faculty Advisor: Cynthia Hall

The present study examined the relationship between psychopathology and personality traits. Psychopathy is conceptualized as having two components, primary and secondary psychopathy (Karpman, 1948; Levenson, Kiehl, & Fitzpatrick, 1995). Primary psychopathy refers to lack of remorse, selfishness, callousness, manipulateness, and inclination to lie while secondary psychopathy refers to impulsivity, being quick to anger, intolerance of frustration, and lack of long-term goals (Karpman, 1948; Levenson et al., 1995). Psychopathy (primary and secondary) has been found to be associated with greater neuroticism, and lower extraversion, agreeableness, and conscientiousness (Miller, Gaughan, & Pryor, 2008; Siebert, Miller, Few, Zeichner, & Lynam). The present study sought to replicate these findings. In addition, greater psychopathy was expected to be associated with greater self-monitoring and lower social desirability due to manipulative responding. A series of bivariate correlations were utilized to examine the association of psychopathy and personality traits. Participants with greater levels of psychopathy (primary and secondary) reported lower agreeableness,  $r(97) = -.562$ ,  $p < .001$  and  $r(97) = -.460$ ,  $p < .001$ , respectively, lower social desirability,  $r(97) = -.371$ ,  $p < .001$  and  $r(97) = -.300$ ,  $p < .01$ , respectively, and greater self-monitoring,  $r(97) = .317$ ,  $p = .001$  and  $r(97) = .207$ ,  $p < .05$ , respectively. Participants with greater levels of secondary psychopathy reported lower conscientiousness,  $r(97) = -.408$ ,  $p < .001$ . As expected, individuals high in psychopathy demonstrated lower agreeableness, social desirability, and greater self-monitoring. Also individuals high in secondary psychopathy demonstrated lower conscientiousness. Findings are consistent with previous literature and suggest psychopaths may lie to appear more socially desirable and are social chameleons able to blend in with others around them.

Funding:

## **112. Effects of Peppermint Flavor and Scent Administration on Augmenting Rugby Play Performance**

Juan Pablo Troconis Bello (Miranda – Venezuela)

Institution: Wheeling Jesuit University  
Field: Social Sciences (Psychology)  
Faculty Advisor: Bryan Raudenbush

Past research indicates peppermint scent administration during athletic performance provides a variety of enhancements. Raudenbush et al. (2002) had athletes undergo a treadmill test with either peppermint, jasmine, or dimethyl sulfide scent. Peppermint scent administration reduced physical and temporal workload, effort, and frustration. Self-evaluated performance was greater in the peppermint condition, and participants indicated greater vigor and lower fatigue. Raudenbush et al. (2001) had participants perform a variety of athletic tasks during peppermint scent administration and found increases in running speed, hand grip strength, and number of push-ups. The present study assessed peppermint administration in a more realistic sports environment, specifically outside of the laboratory with Division II rugby players. Further, a new technique was employed for taste and scent administration, through the use of a flavored mouthguard. Division II rugby players ( $n=19$ ) competed for a two month period during their scheduled athletic season with either a peppermint mouthguard or unflavored/unscented control mouthguard. At the completion of the testing period, measures of mood, workload, motivation and competitive edge were assessed. Results indicated statistically significant effects such that the use of a peppermint mouthguard led to a greater sense of safety ( $t=3.63$ ,  $p=.002$ ), being more energized ( $t=2.12$ ,  $p=0.05$ ), greater feeling of being “psyched up” ( $t=2.54$ ,  $p=.02$ ), and greater performance ( $t=2.60$ ,  $p=.02$ ). In addition, two trends were found such that the peppermint mouthguard enhanced feelings of confidence ( $t=1.93$ ,  $p=.07$ ) and strength ( $t=1.76$ ,  $p=.10$ ).

Funding: West Virginia Space Grant

### **113. Degree of Involvement On-campus and Off-campus as Predictors of Academic Success**

Malaika Woody (Florida)

Institution: University of Charleston  
Field: Social Sciences (Psychology)  
Faculty Advisor: Martha Spiker

Academic achievement and success are of vital importance to both students and universities alike. Much research has demonstrated the positive relationship between on-campus extracurricular activity and academic success (Bakoban & Aljarallah, 2015; Wilson et al., 2014). Additional literature has shown that commuter students tend to be less involved on campus than their residential counterparts and are much more likely to work many hours per week (Alfano & Eduljee, 2013; Newbold, Mehta, & Forbus, 2011). Whether work commitments and lack of campus involvement have a negative effect on commuter student GPAs is unclear. This proposed study aims to identify the amount of on-campus vs. off-campus commitments experienced by students and their relationship to student GPA. A measure of engagement will be administered that evaluates each student's degree of on-campus and off-campus engagement including an assessment of the number of hours spent in each on-campus or off-campus activity. This study demonstrates the differences in commuter and residential student involvement at a small, private university in West Virginia.

Funding:

#### **114. Use of Force in American Policing**

Alec Corapinski (Upshur County, West Virginia)

Institution: West Virginia University

Field: Social Sciences (Sociology)

Faculty Advisor: James Nolan

The purpose of this research is to identify the influences that lead individuals to use force in American society in relation to policing. The method used in this research consists of an anonymous classroom survey comprising 70 undergraduate students and 12 Law Enforcement officers (Leo). The preliminary results: Leo's and non-Leo's used lethal force at approximately the same rate. Females were almost twice as likely as males to use lethal force, when a rape was involved. They were almost twice as likely to use non-lethal force than males on average. Respondents that believe the media portrays use of force accurately also believe that the police use force too much. Those that believe the media's portrayal is inaccurate feel force is used just enough or too little. Respondents on the political right used lethal force approximately 5 times the rate of those on the left. Respondents on the political left felt that assaulting a Leo's was acceptable at twice the rate of those on the right. As the respondent's income increased so did their propensity to use lethal force. Clearly the research indicates that demographics and social psychological labels have correlations to the respondents' use of force decisions. The small convenient sample fails to provide a full picture, and further research is needed to make a definitive analysis. The conclusion of this research will shed light on the factors influencing use of force and provide a deeper understanding in an effort address the actual factors leading to unequal use of force.

Funding:

### **115. One Youth Soccer Coach's Maiden Implementation of the Tactical Games Model**

Obidiah Atkinson (Ontario County, West Virginia)

Institution: West Virginia University

Field: Social Sciences (Sports Coaching)

Faculty Advisor: Stephen Harvey

There is a dearth of studies examining how coaches incorporate game-centered approaches (GCAs) such as the Tactical Games Model (TGM; Mitchell, Oslin, & Griffin, 2013) into their practice. GCAs such as TGM demand that coaches negotiate the interplay of technical and tactical skills through stepping back and asking questions. The purpose of this study was to investigate one youth soccer coach's maiden implementation of TGM. Eight, TGM-focused soccer sessions were conducted with a U12 travel team. Quantitative data were collected through systematic observation of lesson context and teacher behavior in three of the TGM sessions (2, 4 and 6). Qualitative data were generated through the completion of Post Teaching Reflection Analyses (Dyson, 1994) after each session and three semi-structured interviews. TGM fidelity was established through model benchmark analyses (Metzler, 2011). Lesson context, teacher behavior and model benchmark data were analyzed descriptively and qualitative data inductively to generate themes. Teacher behavior data showed high levels of verbal instruction including questioning, specific observation and management. Positive feedback was higher than corrective feedback. Qualitative findings supported quantitative data, indicating that coach "absolutely loved" using TGM. The coach specified how sessions were planned thoughtfully with consideration of the players' needs. The coach's use of questioning improved immeasurably directly impacting the players' engagement in sessions. This study provides a rich, contextual analysis of one youth soccer coach's maiden implementation of TGM and can act as a template for further studies on the benefits and challenges of incorporating TGM into other neophyte youth sports coaches' practice.

Funding:

## **116. Co-Ed Proms at West Virginia University**

Elana Zambori (Ohio County, West Virginia)

Institution: West Virginia University

Field: Social Sciences (Women's Studies)

Faculty Advisor: Cari Carpenter

In 2016, West Virginia University celebrated 125 years of women attending the university and recognized distinguished female alumni. But, male students at the university, were not always receptive of sharing the classroom, and the right to learn, with their female counterparts. People overlook the original reasoning behind the label of “co-ed.” The label “co-ed” was the term used for a female student at a co-educational institution. Under supervision of Lillian Waugh, PhD., and Dr. Cari Carpenter, director of the Women and Gender Studies department, I shall present research about a series of co-ed proms, in 1922, 1923, and 1925, that were organized by female students at WVU, during the same decade women gained suffrage. Along with the help of female instructors, women from town, and wives of faculty members, female students held their first “co-ed” only prom on Veteran’s Day in 1922 at the WVU Armory which was attended by a majority of the female student body. The male students were outraged at this co-ed only function and wrote a responding article “Ko-Eds Krow Kause Males Kant Kompetete” which I will include in my presentation. This unexplored piece of history showcases how women stood together to create an event centered on promoting female comradery during the 1920s, a turning point decade for the feminist movement. Using articles published in the Centenary Currents and archives in the West Virginia Regional History Center, I will shed light on a significant and overlooked piece of women’s history in West Virginia.

Funding: