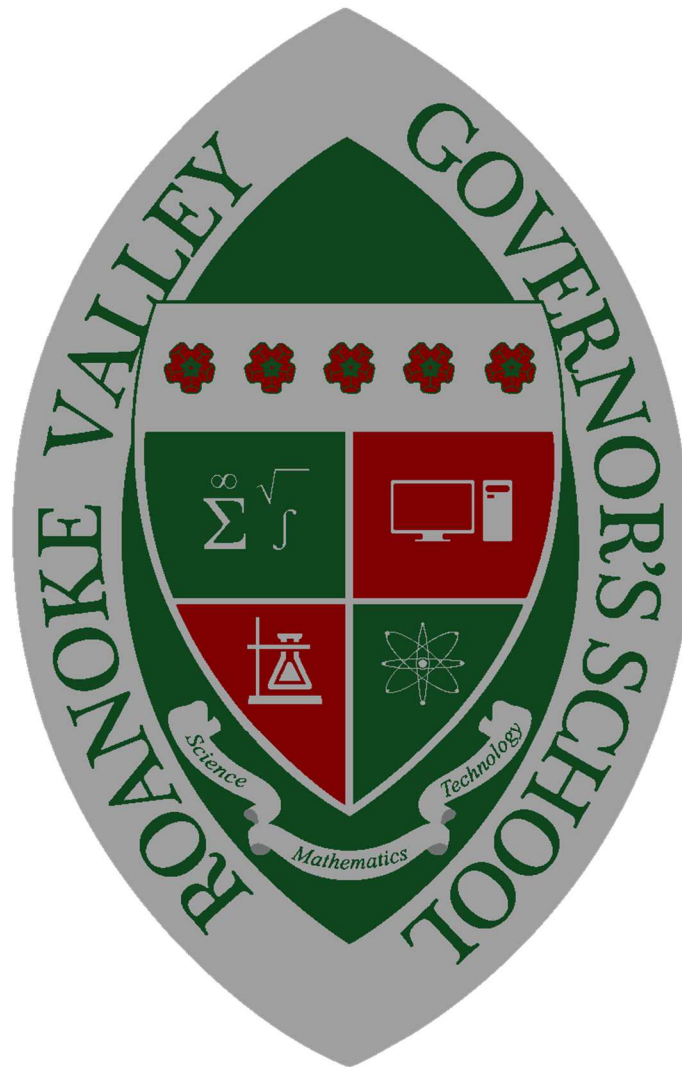


The Roanoke Valley Governor's School For Science and Technology 2021 Student Project Forum



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Cindy Bohland (Chair), Drew Hurst, Steve Smith, Joanne Villers, Steve Villers, Connor Wade

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Fred Hoffman

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Riley Wood, CB 1
Walker Wright, ES 1
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Griffin Yakob, AS-B 5
Michelle Zheng, BH 2

ANIMAL SCIENCES A

AS-A 1 The Effect of *Holothuroidea* on the Regeneration Rate of *Dugesia tigrina*

Thomas (Trey) Joyce, III, Salem High School

Barbara (Ayla) Lampros, Salem High School

Teacher sponsor: Mr. Don Wages

AS-A 2 The effect of Cannabidiol on *C. elegans* movements

David (Chase) Cumins, Patrick Henry High School

Garrett Kelly, Patrick Henry High School

Alexander Martin, Patrick Henry High School

Teacher sponsor: Ms. Cindy Bohland

AS-A 3 The Effect of Aloe vera on the Regeneration Rate of *Dugesia tigrina*

Kathryn (Kate) Feldmann, Patrick Henry High School

Penelope Roberts, Patrick Henry High School

Teacher sponsor: Mr. Don Wages

AS-A 4 The Effect of *Symphytum officinale* on the Regeneration Rate of *Dugesia tigrina*

Arthur Downs, Patrick Henry High School

Teacher sponsor: Mr. Don Wages

AS-A 5 The Effect of *Catharanthus roseus* on the Regeneration Rate of *Dugesia tigrina*

Seth Huard, Lord Botetourt High School

Keaton Lucas, Lord Botetourt High School

Teacher sponsor: Mr. Don Wages

AS-A 6 Using the Embryonic *Danio rerio* Stress Response System to Investigate the Toxicity of Metal Oxide Nanoparticles

Uyen Tran, William Fleming High School

Teacher sponsor: Ms. Cindy Bohland

AS-A 7 The Effect of *Oxydendrum arboreum* Honey on the Regeneration Rate of *Dugesia tigrina*

Jeremiah Morgiewicz, Patrick Henry High School

Nikolai Morgiewicz, Patrick Henry High School

Teacher sponsor: Mr. Don Wages

AS-A 8 The Effect of *Vitis vinifera* on the Regeneration Rate of *Dugesia tigrina*

Grace Harig, Patrick Henry High School

Kira McGinnis, Patrick Henry High School

Teacher sponsor: Mr. Don Wages

ANIMAL SCIENCES B

AS-B 1 The Effect of Aloe vera on the Regeneration Rate of *Dugesia tigrina*

Evelyn Anderson, Cave Spring High School

Kiersten Lauer, Northside High School

Teacher sponsor: Mr. Don Wages

AS-B 2 The Effect of *Cinnamomum verum* on the Regeneration Rate of *Dugesia tigrina*

Carter Baka-Collins, James River High School

Seth Richards, Lord Botetourt High School

Teacher sponsor: Mr. Don Wages

AS-B 3 The Effect of Propylene Glycol and Nicotine on the Behavior of *Drosophila melanogaster* and their Offspring

Ann Foust Bailey, Patrick Henry High School

Lillian Dorathy, Patrick Henry High School

Fiona Murphy, Patrick Henry High School

Teacher sponsor: Ms. Cindy Bohland

AS-B 4 The Effect of Beta Glucan on the Regeneration Rate of *Dugesia tigrina*

Luke Sumner, Franklin County High School

Teacher sponsor: Mr. Don Wages

AS-B 5 The Effect of Propolis on the Regeneration Rate of *Dugesia tigrina*

Courtney Monard, Hidden Valley High School

Griffin Yakob, William Byrd High School

Teacher sponsor: Mr. Don Wages

AS-B 6 The Effect of *Curcuma longa* on the Regeneration Rate of *Dugesia tigrina*

Kathryn Cumins, Patrick Henry High School

Seth Perry, Patrick Henry High School

Teacher sponsor: Mr. Don Wages

AS-B 7 Investigation of Bioprinted Hydrogels for Purification of *Danio rerio* Habitats During Embryonic Development

Alicia Carvalho, Cave Spring High School

Liala Sofi, Hidden Valley High School

Teacher sponsor: Ms. Cindy Bohland

AS-B 8 The Effect of *Musa acuminata* on Regeneration Rate of *Dugesia tigrina*

Joseph Beasley, Patrick Henry High School

Samuel Crawford, Patrick Henry High School

Teacher sponsor: Mr. Don Wages

BIOMEDICAL AND HEALTH SCIENCES

BH 1 Comparing the Efficacy of Different Face Masks Using T4 Bacteriophage Droplets

Alexandra (Lexie) Rhodes, Hidden Valley High School

Camly Tran, Northside High School

Teacher sponsor: Ms. Cindy Bohland

BH 2 The Effect of Gold Nanoparticles on Cell Proliferation and Collagen Production in Neonatal Human Dermal Fibroblasts

Margaret Laflam, Hidden Valley High School

Natalie Saville, William Fleming High School

Michelle Zheng, Cave Spring High School

Teacher sponsor: Ms. Cindy Bohland

BH 3 A Review of the Sensitivity and Specificity of Lung Ultrasound Compared with Chest X-Rays in Diagnosing Pneumonia

Meitra Kazemi, Hidden Valley High School

Teacher sponsor: Mr. Brandon Taylor

BH 4 Comparing the Change in Genetic Composition of the HA Protein of Influenza A Subtypes Over Time

Taylor Dawson, William Byrd High School

Owen McKenna, Patrick Henry High School

Teacher sponsor: Mr. Mark Levy

BH 5 An Investigation of the Accumulation of Mutations in the COVID19 Genome

Tracy (Harrison) Callis, Patrick Henry High School

Elizabeth Fedor, William Byrd High School

Teacher sponsor: Mr. Mark Levy

BH 6 Application of Raman Spectroscopy Biomarkers to Rametrix

Lacey Ngo, William Fleming High School

Teacher sponsor: Ms. Cindy Bohland

BH 7 Assessing the Efficacy of Current Vaccines Against Emerging SARS-Cov-2 Variants

Abhinav (Abhi) Karri, Hidden Valley High School

Teacher sponsor: Mr. Mark Levy

CELLULAR AND MOLECULAR BIOLOGY

CM 1 Analyzing the Cell Viability and Cell Signaling Activity of an Alginate-based Synthetic Extra-Cellular Matrix Scaffold

Catherine Chen, Cave Spring High School

Caroline Grant, Hidden Valley High School

Vineel Kavuru, Hidden Valley High School

Teacher sponsor: Ms. Cindy Bohland

CM 2 Viral Hijacking of Intercellular Junctions Facilitates Spread

David Whitacre, Hidden Valley High School

Teacher sponsor: Mr. Brandon Taylor

CM 3 The Effect of Varying Structured Environments on the Regenerative Properties of Liver Cells

Katherine (Rosie) Giles, Patrick Henry High School

Allyson Hoosier, Patrick Henry High School

Julie Vong, Patrick Henry High School

Teacher sponsor: Ms. Cindy Bohland

CM 4 Using CRISPR-Cas9 to Edit Human Breast Cancer Fibroblasts in Cell Culture

Madison Brown, Franklin County High School

Dhruvi Patel, Glenvar High School

Teacher sponsor: Ms. Cindy Bohland

CM 5 The Effect of Kaempferol and Myricetin on Breast Cancer Cell Proliferation and the Expression of the Bcl-2 Gene

Lynn Park, Lord Botetourt High School

Annelise Wolfe, Lord Botetourt High School

Teacher sponsor: Mr. Brandon Taylor

CM 6 The Effect of Nanoparticles on Cell Division

Alex Porras, Patrick Henry High School

Rachel Roberts, Patrick Henry High School

Delaney Smith, Patrick Henry High School

Teacher sponsor: Ms. Cindy Bohland

COMPUTATIONAL BIOLOGY

CB 1 Determining Correlation Between Population Size and Genetic Diversity of Endangered Species

Tai Phan, Northside High School

Riley Wood, Franklin County High School

Teacher sponsor: Mr. Mark Levy

CB 2 Investigating Alternatives to Conventional Chronic Kidney Disease Treatment Through Analysis of Differential Gene Expression

London Paige, William Fleming High School

Teacher sponsor: Mr. Mark Levy

CB 3 An Examination of Sickle Cell using Differential Gene Expression Analysis

Simran Gill, Salem High School

Jamesa (Mecayla) Gray, Franklin County High School

Teacher sponsor: Mr. Mark Levy

CB 4 Bioinformatics Study of Arrhythmia to Explore Potential Treatment Options

Hassan Al-Qattan, Patrick Henry High School

Teacher sponsor: Mr. Mark Levy

CB 5 The Effect of Air Quality on the Risk of Pancreatic Cancer

Sarah Hall, William Fleming High School

Ethan Johnson, William Fleming High School

Teacher sponsor: Mr. Mark Levy

CB 6 Comparing Similar Brain-Deteriorating Diseases to Discover Common Pathologies

Jodeci Dawson, William Fleming High School

Riley McReynolds, William Fleming High School

Teacher sponsor: Mr. Mark Levy

CB 7 The Genetic Correlation Between Multiple Sclerosis and Various Autoimmune and Neurodegenerative Diseases

Ella Bryant, Northside High School

Holly Hinchy, Cave Spring High School

Teacher sponsor: Mr. Mark Levy

EARTH AND ENVIRONMENTAL SCIENCES

ES 1 Assessing the Presence of Microplastics and Nanoplastics in Local Freshwater

Leah Germain, Lord Botetourt High School

Walker Wright, Cave Spring High School

Teacher sponsor: Mrs. Joanne Villers

ES 2 Analysis of Microbial Diversity in PCB-Contaminated Soils

Eleanor Little, Patrick Henry High School

Teacher sponsor: Mrs. Joanne Villers

ES 3 The Effect of Sodium Percarbonate on *Chlorella vulgaris* and Algae Growth in Local Water Supply

Anias Clark, Patrick Henry High School

Teacher sponsor: Mr. Brandon Taylor

ES 4 The Effect of Carbon Dioxide on the Feeding Rate of *Vanessa cardui* on *Rudbeckia hirta*

Savannah Cady, Craig County High School

Natalie Overstreet, William Fleming High School

Teacher sponsor: Mrs. Joanne Villers

ES 5 Assessment of Glyphosate in Blue Ridge Honey

Shannon Filer, James River High School

Teacher sponsor: Mr. Steve Smith

ES 6 Use of Titanium Dioxide Nanoparticle Enhanced Paint to Reduce Nitrogen Dioxide Pollution

Lillian Holt, Patrick Henry High School

Megan McGinnis, Patrick Henry High School

Sarah Riddle, Patrick Henry High School

Teacher sponsor: Mrs. Joanne Villers

ES 7 The Effect of a Riverside Dog Park on Water Quality

Titus Counihan, Patrick Henry High School

Teacher sponsor: Mrs. Joanne Villers

ENERGY AND ENVIRONMENTAL ENGINEERING

EE 1 The Effect of Fertilizers on the Hydrocarbon Degradation Ability of *Acinetobacter sp. NF22*

Cecilia Fraticelli, Glenvar High School

Nicholas Louvet, Glenvar High School

Teacher sponsor: Mrs. Joanne Villers

EE 2 A Comparison of Heat Produced by the Combustion of Non-Food Biofuel Resources

Benjamin Blevins, Staunton River High School

Marissa Martin, Northside High School

Teacher sponsor: Mr. Steve Smith

EE 3 A Feasibility Study of Reducing the Carbon Footprint of the Roanoke Valley Governor's School Using Photovoltaic Panels

Falan Peters, Lord Botetourt High School

Cole Stelter, Lord Botetourt High School

Teacher sponsor: Mrs. Joanne Villers

EE 4 Photocatalytic Degredation of Methylene Blue Using Titanium Dioxide Coated Glass Beads

Cathryn (Rynn) Little, Patrick Henry High School

Teacher sponsor: Mr. Steve Smith

EE 5 The Effect of a Whale Fin Shaped Blade on the Energy Output of a Wind Turbine

Charles (Bass) Beasley, Jr., Patrick Henry High School

Maximillian Roberson, Patrick Henry High School

Teacher sponsor: Mrs. Joanne Villers

EE 6 Alternatives for Corn Based Biofuel

Paulo Carey, Franklin County High School

Parker Chapman, Franklin County High School

Teacher sponsor: Mr. Steve Smith

EE 7 The Ability of Duckweed to Remove Heavy Metal Contamination from Water

Anna Frittman, Lord Botetourt High School

Aaron Henion, Cave Spring High School

Teacher sponsor: Mr. Steve Smith

EE 8 The Effect of Natural Dyes on the Efficiency of Dye-Sensitized Solar Cells

Josephine (Josie) Fraticelli, Glenvar High School

Cole Price, Staunton River High School

Teacher sponsor: Mr. Steve Smith

ENGINEERING MECHANICS A

EM-A 1 Head Driven Wheelchair

Nelson Laine, Franklin County High School
Bailey McNeil, Franklin County High School
Teacher sponsor: Mr. Drew Hurst

EM-A 2 Bluetooth-Controlled Lockbox

Sarah Grace Stanley, Patrick Henry High School
Silvia Wardell, Patrick Henry High School
Teacher sponsor: Mr. Drew Hurst

EM-A 3 Writing Arduino Arm

Roxanne Culley, Patrick Henry High School
Luke Moon, Patrick Henry High School
Teacher sponsor: Mr. Connor Wade

EM-A 4 A Robotic Arm that Waters Plants

Bakari Deskins, Franklin County High School
Vy Nguyen, William Fleming High School
Chloe Roberts, Patrick Henry High School
Teacher sponsor: Mr. Connor Wade

EM-A 5 Robotic Arm Capable of Picking up and Moving Objects With an Electromagnet

Katherine Aziz, Patrick Henry High School
Parker Neal, Patrick Henry High School
Teacher sponsor: Mr. Connor Wade

EM-A 6 Litter Picker Upper 2.0

Aaliyah Dixon, William Fleming High School
Teacher sponsor: Mr. Drew Hurst

EM-A 7 Robotic Arm to Transfer Liquids

Jack Ericsson, Patrick Henry High School
Zoie Mills, William Fleming High School
Hudson (Cole) Stevens, Patrick Henry High School
Teacher sponsor: Mr. Connor Wade

EM-A 8 Bluetooth-Enabled Webcam for Educators

William (Maxwell) Stevens, Patrick Henry High School
Tobias (Toby) Tate, Patrick Henry High School
Teacher sponsor: Mr. Drew Hurst

EM-A 9 Rotating Weekly Pill Dispenser

Kierstyn Stanley, Lord Botetourt High School
Sydney Vokus, Lord Botetourt High School
Teacher sponsor: Mr. Drew Hurst

ENGINEERING MECHANICS B

EM-B 1 Voice Activated Water Dispenser

Canaan (Cane) Fetzer, Cave Spring High School

Andrew Sakamoto, Hidden Valley High School

Teacher sponsor: Mr. Connor Wade

EM-B 2 Walk Safe Cane

James (Ford) Beasley, Patrick Henry High School

Declan Morrill, Patrick Henry High School

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EM-B 3 Cloth Folder

Collin Rice, Patrick Henry High School

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EM-B 4 Electronic Doorman

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EM-B 5 Robotic Arm for Scooping Food

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Teacher sponsor: Mr. Connor Wade

EM-B 6 Robotic Corona Virus Testing

Merryn Isbell, Patrick Henry High School

Lillian (Libby) Jamison, Patrick Henry High School

Teacher sponsor: Mr. Connor Wade

EM-B 7 The Folding Arm

Tristan Kerr, Patrick Henry High School

Christopher (Durbin) Stevens, Patrick Henry High School

Teacher sponsor: Mr. Connor Wade

EM-B 8 Superior Solar

Isaac Fix, William Byrd High School

Evan Jennings, Lord Botetourt High School

Teacher sponsor: Mr. Drew Hurst

EM-B 9 3D Printed Centrifuge

Chloe Beasley, Lord Botetourt High School

Parker Hudson, Lord Botetourt High School

Teacher sponsor: Mr. Drew Hurst

ENGINEERING MECHANICS C

EM-C 1 The Whelevator

Roman Ciulla, Franklin County High School
Conner Deering, Franklin County High School
Teacher sponsor: Mr. Drew Hurst

EM-C 2 UV Light Sanitation Hood

Sydnee Durham, Patrick Henry High School
Ruby Isbell, Patrick Henry High School
Teacher sponsor: Mr. Drew Hurst

EM-C 3 Planting a Cilantro Seed with a Robotic Arm

Ryan (Davis) Cooper, Lord Botetourt High School
Georgia Honts, James River High School
Teacher sponsor: Mr. Connor Wade

EM-C 4 Robotic Arm opening Glass Bottle Tops

Coleman Grindstaff, Franklin County High School
Hunter Sipe, William Byrd High School
Teacher sponsor: Mr. Connor Wade

EM-C 5 Smart Pet Feeder

Andrew Gloudemans, Staunton River High School
Teacher sponsor: Mr. Drew Hurst

EM-C 6 The COVID Bot

Fady Abdelmalak, Salem High School
Ethan Fouch, Lord Botetourt High School
Teacher sponsor: Mr. Drew Hurst

EM-C 7 Robotic Arm: Scooping Pet Food and Placing it in a Bowl

Mary (Katelyn) Crumpacker, Salem High School
Savannah Peters, Franklin County High School
Teacher sponsor: Mr. Connor Wade

EM-C 8 Taco Robot

Savannah (Paige) Netting, Salem High School
Erica Blake Sellars, Franklin County High School
Teacher sponsor: Mr. Connor Wade

ENGINEERING MECHANICS D

EM-D 1 The Claw Arm

Robert Berry, Patrick Henry High School
John Paul (JP) Prusakowski, Patrick Henry High School
Teacher sponsor: Mr. Connor Wade

EM-D 2 Unmanned Fire Assistant Robot

Benjamin Anderson, Patrick Henry High School
Jonah Mroz-Roakes, Patrick Henry High School
Teacher sponsor: Mr. Drew Hurst

EM-D 3 Mini Theremin

Riley Kerr, Patrick Henry High School
Teacher sponsor: Mr. Drew Hurst

EM-D 4 Mini Wind Turbine

Griffin Kauffman, Patrick Henry High School
Riley VanAken, Patrick Henry High School
Teacher sponsor: Mr. Drew Hurst

EM-D 5 Robotic Throwing Arm

Trinity Breedlove, Patrick Henry High School
Cameron Snyder, Patrick Henry High School
Teacher sponsor: Mr. Connor Wade

EM-D 6 Electric Skates

Charles Meidlinger, Patrick Henry High School
Teacher sponsor: Mr. Drew Hurst

EM-D 7 Plant Watering Robotic Arm

Nathan Sprouse, Cave Spring High School
Ethan Su, Hidden Valley High School
Teacher sponsor: Mr. Connor Wade

EM-D 8 Room Occupancy Tracker

Matthew Scarlatescu, Hidden Valley High School
Teacher sponsor: Mr. Drew Hurst

MATERIALS SCIENCE

MS 1 Investigating Various Properties of a Rubber Polymer Produced from Sulfur and Canola Oil

Reese Robers, Patrick Henry High School

Emma Seidel, Patrick Henry High School

Teacher sponsor: Mr. Steve Smith

MS 2 The Production of Fabric from *Pleurotus eryngii* and *Ganoderma lingzhi* Mycelia

Reesa Devers, Patrick Henry High School

Taylor Frazier, Patrick Henry High School

Teacher sponsor: Mrs. Joanne Villers

MS 3 The Effect of Nanoparticles on the Properties of a Chitosan-Alginate Polymer

Jasmine Walker, William Fleming High School

Teacher sponsor: Mr. Steve Smith

MS 4 The Effect of Natural Polymers on the Sustainability of Adhesive Hydrogels for Tissue Repair

Katherine Cross, Lord Botetourt High School

Haley Day, William Byrd High School

Teacher sponsor: Mr. Steve Smith

MS 5 The Effect of Carbon Nanotubes on the Tensile Strength and Conductivity of *Bombyx mori* Silk

Benjamin Collier, Patrick Henry High School

Emily Kiser, Staunton River High School

Teacher sponsor: Mrs. Joanne Villers

MS 6 The Antibacterial Effect of Adding Metal Nitrates to a Sodium Alginate Hydrogel

Sarah Spradlin, Staunton River High School

Teacher sponsor: Mr. Steve Smith

MS 7 The Effect of Polyol to Diisocyanate Ratios on the Sound Absorption of Polyurethane Foam

Anna Halsdorf, Patrick Henry High School

Penelope Smith, Patrick Henry High School

Teacher sponsor: Mr. Steve Smith

MS 8 The Application of a Chitosan Cross-linked Poly(acrylic acid) Hydrogel in the Removal of a Model Pollutant from an Aqueous Solution

Rebecca Qiu, William Byrd High School

Ainsley Robertson, Cave Spring High School

Teacher sponsor: Mr. Steve Smith

MICROBIOLOGY A

MI-A 1 The Effect of *Melaleuca alternifolia* EO on the Growth of *E. coli*

Faith Kuehl, Patrick Henry High School
Annika Plunkett, Patrick Henry High School
Teacher sponsor: Ms. Laura Roark

MI-A 2 The Effect of Cinnamon Essential Oil on the Growth of *E. coli*

Charlie Comer, Franklin County High School
Natalie Davis, Franklin County High School
Teacher sponsor: Ms. Laura Roark

MI-A 3 Demographics of Crowdsourcing Compared to Clinical Sample Collection

Hannah Peters, Franklin County High School
Teacher sponsor: Mr. Brandon Taylor

MI-A 4 The Effect of *Thymus capitatus* Essential Oil on the Growth of *E. coli*

Nate Faulkner, Cave Spring High School
Christina Okenquist, Northside High School
Teacher sponsor: Ms. Laura Roark

MI-A 5 The Effect of Green Tea and Honey on the Growth of *E. coli*

Elisabeth Tershak, Patrick Henry High School
Isabella (Bella) Whittle, Patrick Henry High School
Teacher sponsor: Ms. Laura Roark

MI-A 6 The Effect of Lead (II) Nitrate, Copper (II) Nitrate, Zinc Nanoparticles, and Titanium Dioxide Nanoparticles on the Luminosity of *Vibrio fischeri*

Clara Higgins, Patrick Henry High School
Abigail Hunter, Patrick Henry High School
Olivia Reichardt, Patrick Henry High School
Teacher sponsor: Ms. Cindy Bohland

MI-A 7 The Effect of *Moringa oleifera* on the Growth of *E. coli*

Elliott (Ellie) McClung, Lord Botetourt High School
Heidi Thompson, Cave Spring High School
Teacher sponsor: Ms. Laura Roark

MI-A 8 The Synergistic Effect of Pomegranate Rind Extract and Ciprofloxacin on the Growth of *E. coli*

Reese Redford, Salem High School
Teacher sponsor: Ms. Laura Roark

MICROBIOLOGY B

MI-B 1 The Effect of *Illicium verum* Essential Oil on The Growth of *E. coli* K-12

Jacob Jackson, Patrick Henry High School

Oliver Luci, Patrick Henry High School

Teacher sponsor: Ms. Laura Roark

MI-B 2 The Use of a Fluorescent pH-Biosensor to Image Yeast Organelles

Grace Kahoun, Patrick Henry High School

Emma Thielecke, Patrick Henry High School

Teacher sponsor: Ms. Cindy Bohland

MI-B 3 The Effect of Chamomile Essential Oil on the Growth of *E. coli*

Mia Kekerovic, William Fleming High School

Nevaeh Lambert, William Fleming High School

Teacher sponsor: Ms. Laura Roark

MI-B 4 The Effect of Clove Oil on the Growth of *E. coli*

Zane Ellis, Staunton River High School

Thomas (TJ) Hinson, Salem High School

Teacher sponsor: Ms. Laura Roark

MI-B 5 The Synergistic Effect of Cinnamon Bark Oil and Chloramphenicol on the Growth of *E. coli*

Ayden McNulty, William Fleming High School

Sofia Silvergate, William Fleming High School

Teacher sponsor: Ms. Laura Roark

MI-B 6 The Effect of Pomegranate Essential Oil on the Growth of *E. coli*

Emiley Harris, Staunton River High School

Teacher sponsor: Ms. Laura Roark

MI-B 7 The Effect of *Trametes veriscolor* Infused Bandages on *Staphylococcus epidermidis*

Emma Kate Greer, Patrick Henry High School

Cynthia Lin, Franklin County High School

Jennie Pham, William Fleming High School

Teacher sponsor: Mrs. Joanne Villers

MI-B 8 The Effect of Oregano Essential Oil on the Growth of *E. coli*

Emma Batty, Patrick Henry High School

Caroline O'Keeffe, Patrick Henry High School

Teacher sponsor: Ms. Laura Roark

PLANT SCIENCES A

PS-A 1 The Effect of Silver Nanoparticles on the Tobacco Mosaic Virus

Sara Drewry, Patrick Henry High School

Teacher sponsor: Ms. Cindy Bohland

PS-A 2 The Allelopathic Effect of *C. lanatus* on the Germination and Growth of *S. media*

Taylor Prillaman, Patrick Henry High School

Anna Reid, Patrick Henry High School

Teacher sponsor: Mr. Matthew Browning

PS-A 3 The Autotoxic Effect of *P. americana*

Grace Bowman, Franklin County High School

Teacher sponsor: Mr. Matthew Browning

PS-A 4 The Effect of Ethanol Vapor on the Ripening of *Lycopersicon esculentum*

Claire Dozier, Lord Botetourt High School

Raghav Vasudeva, Hidden Valley High School

James Voight, James River High School

Teacher sponsor: Mrs. Joanne Villers

PS-A 5 The Allelopathic Effect of *A. millefolium* on the Germination and Growth of *T. aestivum*

Mieko DeKorsey, Patrick Henry High School

Chloe DeKorsey, Patrick Henry High School

Teacher sponsor: Mr. Matthew Browning

PS-A 6 The Effect of an Invasive Species-Derived Herbicide on Other Inhibitory, Non-Native Flora

Ryan Mollin, Franklin County High School

Teacher sponsor: Mr. Steve Smith

PS-A 7 The Allelopathic Effect *M. Nigra* on the Germination and Growth of *P. Parentesis*

Evan Shifflett, Patrick Henry High School

Alexios (Lex) Stratton, Patrick Henry High School

Teacher sponsor: Mr. Matthew Browning

PS-A 8 The Allelopathic Effect of *B. oleracea var. italica* on the Germination & Growth of *R. sativus*

Rava (Mak) Nester, Staunton River High School

Teacher sponsor: Mr. Matthew Browning

PS-A 9 The Effect of Benzyl Isothiocyanate Concentration on the Germination and Growth of *Raphanus sativus* and *Lamium purpureum*

Kaleb Fricke, William Fleming High School

Autumn O'Connor, Patrick Henry High School

Teacher sponsor: Mr. Steve Smith

PS-A 10 The Allelopathic Effect of *H. annuus* on the Germination & Growth of *D. Ciliaris*

Erika Terry, Staunton River High School

Teacher sponsor: Mr. Matthew Browning

PLANT SCIENCES B

PS-B 1 The Synergistic Allelopathic Effect of Extracts from Two Invasive Species on Germination and Growth of *E. hystrix*

Daniel Han, Cave Spring High School

Carson Ray, Cave Spring High School

Teacher sponsor: Mr. Matthew Browning

PS-B 2 The Effect of Nanoparticles on the Germination Rate and Radicle Length of Radish Seeds

Krischal Sutar, William Fleming High School

Darryl Wilson, III, William Fleming High School

Teacher sponsor: Mr. Steve Smith

PS-B 3 The Allelopathic Effect of *C. esculentus* v. *chufa* on the Germination & Growth of *L. vulgaris*

Aidan Mayhue, Lord Botetourt High School

Emma Pope, Glenvar High School

Teacher sponsor: Mr. Matthew Browning

PS-B 4 The Allelopathic Effect of *A. miller* on the Germination and Growth of *T. officinale*

Margaret Kauffman, Patrick Henry High School

Natalie Pham, William Fleming High School

Teacher sponsor: Mr. Matthew Browning

PS-B 5 The Effect of Juglone in Conjunction with Multi-Walled Carbon Nanotubes on the Germination and Radicle Length of Legumes

Maggie Parkhurst, William Byrd High School

Sophia Schumaecker, Cave Spring High School

Claire Wei, Cave Spring High School

Teacher sponsor: Mr. Steve Smith

PS-B 6 The Synergistic Allelopathic Effect of *L. Albus* Organs and *P. fluorescens* on the Germination and Growth of *B. Tectorum*

Myah Martin, Staunton River High School

Zoe Silva, Staunton River High School

Teacher sponsor: Mr. Matthew Browning

PS-B 7 The Effect of Light, Stratification, and Genotype on Germination of *Arabidopsis thaliana*

Adithya (Adi) Iyer, William Byrd High School

Teacher sponsor: Ms. Cindy Bohland

PS-B 8 The Allelopathic Effect of Juglone on the Germination & Growth of *C. melo* var. *cantaloupensis* and *R. sativa*

Benjamin Dye, Franklin County High School

Teacher sponsor: Mr. Matthew Browning

PS-B 9 The Allelopathic Effect of *P. persica* on the Germination & Growth of *F. ananassa*

Joshua Ruppel, Patrick Henry High School

Teacher sponsor: Mr. Matthew Browning

SYSTEMS SOFTWARE A

SS-A 1 Encryption and Decryption of Messages using Steganography in Python

Spencer Kearns, Staunton River High School

Abby Wyatt, Staunton River High School

Teacher sponsor: Mr. Doug Divers

SS-A 2 Integrated Calendar

Lucas Mann, Franklin County High School

Forrest Moorman, Franklin County High School

Teacher sponsor: Mr. Doug Divers

SS-A 3 Verto.exchange

Tate Berenbaum, Salem High School

Teacher sponsor: Mr. Drew Hurst

SS-A 4 The Use of Python to Count Blood Cells

Tristen (Jack) David, Franklin County High School

Tyler VanDyke, Craig County High School

Teacher sponsor: Mr. Doug Divers

SS-A 5 Using Python to Create a Tweet Algorithm Based on Identified Trends

Amelia Kitt, Patrick Henry High School

Chase Sweeney, Patrick Henry High School

Teacher sponsor: Mr. Doug Divers

SS-A 6 Programming a Game in Python

William (Alexander) Branscom, Patrick Henry High School

Anna West, Patrick Henry High School

Teacher sponsor: Mr. Doug Divers

SYSTEMS SOFTWARE B

SS-B 1 Time Management Assistance Program

Shane Cockram, Franklin County High School

Liam May, Franklin County High School

Teacher sponsor: Mr. Doug Divers

SS-B 2 Scholarship Finder

Jackson Konstance, Hidden Valley High School

Cole Konstance, Hidden Valley High School

Teacher sponsor: Mr. Doug Divers

SS-B 3 Transferring Text to Auditory Language for the Visually Impaired

Alex Kurtz, Franklin County High School

Eliza Quesenberry, Franklin County High School

Teacher sponsor: Mr. Doug Divers

SS-B 4 Web Scraping Within Python to Enhance Online Shopping

Joseph Sandzimier, William Byrd High School

Jacob Tozier, Cave Spring High School

Teacher sponsor: Mr. Doug Divers

SS-B 5 Web Scraping as a Means of Understanding Digital Footprints

Stephen (Frank) Andes, Patrick Henry High School

Owen Himmel, Patrick Henry High School

Teacher sponsor: Mr. Doug Divers

SS-B 6 Utilizing Python and Machine Learning to Analyze the Validity of News Articles

Brayden Whitlow, Franklin County High School

Timothy Wilson, James River High School

Teacher sponsor: Mr. Doug Divers

