The Roanoke Valley Governor’s School for Science and Technology

2024 Student Project Forum

The Roanoke Valley Governor’s School for Science and Technology is supported by the Virginia Department of Education and the public school divisions of the Roanoke Valley. The RVGS Community is grateful for the support and financial commitment from our participating school districts:

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

Additional Staff
Ra Siv (Operations staff); Fred Hoffman (Adjunct Faculty/Intersession Support); Terri Janiga (Community Outreach Coordinator)

The faculty and staff of the Roanoke Valley Governor’s School wish to thank those who have supported the student research effort during this academic year. In particular, we wish to acknowledge the generous support and assistance provided by:

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Laila Alam, MS 6
Eyad Al-Aromah, SS-B 6
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Nikolai Morgiewicz, SS-B 4
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ANIMAL SCIENCES A

**AS-A 1** The Effect of Levodopa and Valerian Extract on Movement in a *C. elegans* Model for Parkinson's Disease
Elsy Cruz-Nolasco, William Fleming High School
Caroline Reichardt, Patrick Henry High School
Teacher sponsor: Ms. Cindy Bohland and Mr. Steve Villers

**AS-A 2** The Ameliorative Effect of Carotenoid-Producing Yeast on the Memory of a Drosophila Model for Alzheimer's
Keaton Lucas, Lord Botetourt High School
Teacher sponsor: Ms. Cindy Bohland and Mr. Steve Villers

**AS-A 3** The Effect of Curcumin on the Mobility of a Drosophila Model for Parkinson's Disease
Erica Gergely, Lord Botetourt High School
Ellie McClung, Lord Botetourt High School
Teacher sponsor: Ms. Cindy Bohland and Mr. Steve Villers

**AS-A 4** The Effect of *Mentha piperita* on the Heart Rate of *Daphnia magna*
Lachlan Robrecht, Patrick Henry High School
Grady Stinson, Patrick Henry High School
Teacher sponsor: Mr. Don Wages

**AS-A 5** The Effect of Potassium on the Heart Rate of *Daphnia magna*
Julia Landis, Staunton River High School
Caiden Perry, Liberty High School
Teacher sponsor: Mr. Don Wages

**AS-A 6** The Effect of *Curcumin* on the Heart Rate of *Daphnia magna*
Adam Doner, William Fleming High School
Kritesh Sutar, William Fleming High School
Teacher sponsor: Mr. Don Wages

**AS-A 7** The Effect of *Camellia Sinensis* on the Heart Rate of *Daphnia magna*
Kaitlin Jackson, Patrick Henry High School
Sean Powell, Patrick Henry High School
Teacher sponsor: Mr. Don Wages

**AS-A 8** The Effect of Temperature on Plastic Bioremediation by *Galleria mellonella*
Anissa-Rosa Morfa, William Fleming High School
Tammy Phung, William Fleming High School
Teacher sponsor: Mrs. Joanne Villers and Mr. Steve Villers

**AS-A 9** The Effect of *Vitis vinifera* on the Heart rate of *Daphnia magna*
Naomi Fetzer, Cave Spring High School
Avery Klahn, Cave Spring High School
Teacher sponsor: Mr. Don Wages
ANIMAL SCIENCES B

**AS-B 1** The Effect of Darkness on Long-Term Memory of Eyeless Drosophila
Ren Combs-Cannaday, Patrick Henry High School
Maggie Jarrett, Patrick Henry High School
Teacher sponsor: Ms. Cindy Bohland

**AS-B 2** A Comparison of Pharmaceutical and Medicinal Plant Treatments on Seizures in *D. melanogaster*
Frances Reddan, Patrick Henry High School
Cara Wardell, Patrick Henry High School
Teacher sponsor: Ms. Cindy Bohland

**AS-B 3** The Effect of *Panax quinquefolius* on the Heart Rate of *Daphnia magna*
Priya Patel, Glenvar High School
Heidi Wienke, William Byrd High School
Teacher sponsor: Mr. Don Wages

**AS-B 4** The Effect of *Paullinia cupana* on the Heart Rate of *Daphnia magna*
Aeryn Thompson, William Fleming High School
Teacher sponsor: Mr. Don Wages

**AS-B 5** The Effect of *Crataegus oxyacantha* on the Heart Rate of *Daphnia magna*
Gage Allran, Cave Spring High School
Benjamin Meyer, Cave Spring High School
Teacher sponsor: Mr. Don Wages

**AS-B 6** The Effect of *Hibiscus sabdariffa* on the Heart Rate of *Daphnia magna*
Henry Fedak, Patrick Henry High School
Kai Warren, Patrick Henry High School
Teacher sponsor: Mr. Don Wages

**AS-B 7** The Effect of *Garcinia kola* on the Heart Rate of *Daphnia magna*
Lawson Fralin, Patrick Henry High School
Lachlan Thompson, Patrick Henry High School
Teacher sponsor: Mr. Don Wages

**AS-B 8** The Effect of Temperature on the Bleaching of *Leptoseris Coral*
Hannah Hertz, Patrick Henry High School
Brinna Seidel, Patrick Henry High School
Teacher sponsor: Mrs. Joanne Villers and Mr. Steve Villers

**AS-B 9** The effect of hydrocortisone on the cellular regeneration of *Girardia tigrina*
Hana Sageer, Hidden Valley High School
Teacher sponsor: Mr. Steve Smith
ANIMAL SCIENCES C

AS-C 1 Effects of Air Pollution on Fruit Flies
CC Garcia-Quiroz, Patrick Henry High School
Phoenix O'Dell, Patrick Henry High School
Teacher sponsor: Ms. Cindy Bohland

AS-C 2 Using eDNA to Detect an Invasive Crayfish (*Procambarus clarkii*) in the James River
Carter Baka-Collins, James River High School
Teacher sponsor: Ms. Cindy Bohland and Mr. Steve Villers

AS-C 3 The Effect of *Valeriana officinalis* on the Heart Rate of *Daphnia magna*
Jack Le Roy, Floyd County High School
Elodie McClintic, Franklin County High School
Teacher sponsor: Mr. Don Wages

AS-C 4 The Effect of *Capsicum annuum* on the Heart Rate of *Daphnia magna*
Lera Gibson, Franklin County High School
Helena Longstreth, Franklin County High School
Teacher sponsor: Mr. Don Wages

AS-C 5 The Effect of Citric Acid on the Heart Rate of *Daphnia magna*
Nathan Cloutier, Franklin County High School
JT Lomax, Franklin County High School
Teacher sponsor: Mr. Don Wages

AS-C 6 The Effect of *Berberine* on the Heart Rate of *Daphnia magna*
Prateek Reddy, Cave Spring High School
Anish Suryapeta, Cave Spring High School
Teacher sponsor: Mr. Don Wages

AS-C 7 The Effect of *Hibiscus sabdariffa* on Heart Rate of *Daphnia magna*
Audrey Kelley, Patrick Henry High School
Ana Maria Rincon, Patrick Henry High School
Teacher sponsor: Mr. Don Wages

AS-C 8 The Effect of Polyethylene Microplastics on *C. elegans*
Carrie Collins, Lord Botetourt High School
Mirabel Makked, Salem High School
Teacher sponsor: Mrs. Joanne Villers

AS-C 9 The Effect of Arsenic on *C. elegans*
Gabby Harig, Patrick Henry High School
Teacher sponsor: Mrs. Joanne Villers and Mr. Steve Villers

AS-C 10 The absorption and effect of microplastics on *C. elegans*
Emma Baldwin, Salem High School
Dorothy Myers, Salem High School
Teacher sponsor: Mr. Steve Smith
BEHAVIORAL AND SOCIAL SCIENCES

BS 1 Does Ability to Sight Read Music Affect English Reading Speed?
Sallie Boxley, Patrick Henry High School
Teacher sponsor: Mrs. Melissa Fisher

BS 2 Does Social Media Use Impact Attention Span in Adolescents?
Kate Feldmann, Patrick Henry High School
Teacher sponsor: Mrs. Melissa Fisher

BS 3 Are Loneliness and Group Involvement Associated with Substance Use Disorder Recovery?
Grace Harig, Patrick Henry High School
Kira McGinnis, Patrick Henry High School
Teacher sponsor: Mrs. Melissa Fisher

BS 4 The Effect of Visual and Written Counter-Stereotypical Exemplars on Implicit Gender STEM Bias
Cameron McPhee, William Fleming High School
Teacher sponsor: Mrs. Melissa Fisher

BS 5 A Study of Child-Caregiver Relationship Indicators for Those in Child-Centered Play Therapy
Autumn Patterson, William Fleming High School
Teacher sponsor: Mrs. Melissa Fisher

BS 6 A Study of Driver-Road Cyclist Interactions and Methods for Their Improvement
Annika Plunkett, Patrick Henry High School
Teacher sponsor: Mrs. Melissa Fisher

BS 7 The Effect of Extracurricular Participation on Sleep and Mental Health
Penelope Roberts, Patrick Henry High School
Teacher sponsor: Mrs. Melissa Fisher

BS 8 The Relationship Between Personality Type and Procrastination Tendencies
Aleigha Weeks, Salem High School
Teacher sponsor: Mrs. Melissa Fisher
**BIOMEDICAL AND HEALTH SCIENCES**

**BH 1** Investigating the Associations Between Trait Neuroticism, Physiology, and the Effects of Low-Intensity Focused Ultrasound Neuromodulation  
Elisabeth Tershak, Patrick Henry High School  
Teacher sponsor: Mr. Brandon Taylor

**BH 2** The Impact of Aerobic Exercise on Mitochondrial Function in the Hippocampus  
Emma Batty, Patrick Henry High School  
Teacher sponsor: Mr. Brandon Taylor

**BH 3** Assessing the Affects of ACQUIRE Therapy for Children Using a Motor Learning Scale  
Margaret Kauffman, Patrick Henry High School  
Teacher sponsor: Mr. Brandon Taylor

**BH 4** Navigating Disparities in Dental Health - A Mixed-Method Investigation of Access to Dental Care in Virginia  
Courtney Monard, Hidden Valley High School  
Teacher sponsor: Mr. Brandon Taylor

**BH 5** The Effects of Focused Ultrasound on Various Cell Types for Glioblastoma Treatment  
Mieko DeKorsey, Patrick Henry High School  
Teacher sponsor: Mr. Brandon Taylor

**BH 6** The Effect of Hydrophobic Bile Acids on HCT116 Colon Cancer Cells  
Sachita Baskota, Patrick Henry High School  
Himangi Tiwari, Patrick Henry High School  
Teacher sponsor: Ms. Cindy Bohland

**BH 7** Sustainable synthesis of carbon quantum dots as a fluorescence probe in medical bioimaging via a zebrafish model  
Sophia Zeng, Hidden Valley High School  
Teacher sponsor: Mr. Steve Smith
CELLULAR AND MOLECULAR BIOLOGY

CM 1 Dlk1 Locus and Neurogenic Niche Regulation in Developing Cortex of DiGeorge Syndrome Mouse Model
Nate Faulkner, Cave Spring High School
Teacher sponsor: Mr. Brandon Taylor

CM 2 Detection of SARS-CoV-2 Antibodies in Fluids from Various Sources
Diya Reddy, Cave Spring High School
Teacher sponsor: Mr. Brandon Taylor

CM 3 The UV-Protective Ability of Mycosporine-like Amino Acids on Collagen Gene Expression in Human Neonatal Fibroblasts
Raimee Sykes, Lord Botetourt High School
Teacher sponsor: Ms. Cindy Bohland and Mr. Steve Villers

CM 4 Investigating the Effect of L-Ascorbic Acid on the Production of Collagen in Fibroblast Cells
Su Gursoy, William Fleming High School
Ayden McNulty, William Fleming High School
Teacher sponsor: Ms. Cindy Bohland and Mr. Steve Villers

CM 5 Vitamin D's Effect on Saccharomyces cerevisiae Biofilm Formation
Luke Sumner, Franklin County High School
Teacher sponsor: Ms. Cindy Bohland and Mr. Steve Villers

CM 6 Investigating the Role of SNAI2 in the Proliferation of HCT116 Cancer Cells
Kathryn Ha, Salem High School
Claire Rawlins, Salem High School
Teacher sponsor: Ms. Cindy Bohland and Mr. Steve Villers
COMPUTATIONAL BIOLOGY

CB 1 Clinically Relevant Mutations in Genes Associated with Alzheimer's Disease
Kaleb Humerickhouse, Cave Spring High School
Ayush Pinnamaraju, Cave Spring High School
Teacher sponsor: Mr. Mark Levy

CB 2 An Analysis of the Role of DNA Methylation in Oncogenesis
Brenden Hartung, Northside High School
Teacher sponsor: Mr. Mark Levy

CB 3 A Phylogenetic Analysis of the Origin of Neuronal Structures in Basal Holozoa
Brett Smith, Lord Botetourt High School
Teacher sponsor: Mr. Mark Levy

CB 4 A Meta-analysis of the Genetic Basis for Lymphoma Cancer Subtypes
Jack Janiga, Hidden Valley High School
Teacher sponsor: Mr. Mark Levy

CB 5 Analysis of a KRAS G-Quadruplex Pharmacophore for Targeted Cancer Therapy
Griffin Yakob, William Byrd High School
Teacher sponsor: Mr. Mark Levy

CB 6 Bioinformatic Analysis of COVID-19 Mutations
Zane Ellis, Staunton River High School
Teacher sponsor: Mr. Mark Levy
EARTH AND ENVIRONMENTAL SCIENCE

ES 1 Using Zebrafish as a Bioindicator to Test the Bioremediatory Potential of T. versicolor on PFOA
Aidan Callis, Patrick Henry High School
Teacher sponsor: Ms. Cindy Bohland

ES 2 Determining the Potential of Producing Biofuels Using Algae
Emma Pope, Glenvar High School
Teacher sponsor: Ms. Cindy Bohland and Mr. Steve Villers

ES 3 The Effect of Plant Type on Soil Erosion
Mariam Abdelmalak, Salem High School
Teacher sponsor: Mrs. Joanne Villers

ES 4 The Correlation of Arctic Cyclones and Sea Ice Loss and its Relationship to Climate Change
Chloe Herold, Hidden Valley High School
Teacher sponsor: Mrs. Joanne Villers

ES 5 The Effect of Land Use on Stream Health
Nathan Preston, Lord Botetourt High School
Teacher sponsor: Mrs. Joanne Villers

ES 6 The comparison of chemical cleaner vs. naturally made persimmon calyx cleaner on the reduction of E. coli
Kyla Wooldridge, Patrick Henry High School
Teacher sponsor: Mr. Steve Smith

ES 7 The removal of silver nanoparticles in water using calcium bentonite
Rhiannon Stowe, Lord Botetourt High School
Teacher sponsor: Mr. Steve Smith
ENGINEERING MECHANICS A

**EM-A 1** The Impact of Airfoil, Diameter, and Pitch of Propellers on the Maximized Flight Time of a Quadcopter
Austin Frantz, Salem High School
Teacher sponsor: Mr. Brandon Taylor

**EM-A 2** Drawing Robot Arm
Yasmin Shumway, Patrick Henry High School
Amira Shumway, Patrick Henry High School
Teacher sponsor: Mr. Connor Wade

**EM-A 3** EMG Controlled Prosthetic Hand
William Henderson, Franklin County High School
Chase Noel, Franklin County High School
Teacher sponsor: Mr. Connor Wade

**EM-A 4** Self-Playing Ukulele
Kaeli Berry, James River High School
Meribel Pan, Hidden Valley High School
Teacher sponsor: Mr. Connor Wade

**EM-A 5** Crop Leaf Sampling Robot
Daniel Han, Cave Spring High School
Teacher sponsor: Mr. Drew Hurst

**EM-A 6** Spotting Plane
John Aziz, Patrick Henry High School
J.B. Clements, Patrick Henry High School
Teacher sponsor: Mr. Drew Hurst

**EM-A 7** Educational Coding Language and Car
Katie Coles, Patrick Henry High School
Luke Thompson, Patrick Henry High School
Teacher sponsor: Mr. Drew Hurst

**EM-A 8** Automated Seed Planting Robot
Faith Kuehl, Patrick Henry High School
Caroline O’Keeffe, Patrick Henry High School
Teacher sponsor: Mr. Drew Hurst
ENGINEERING MECHANICS B

**EM-B 1** Autonomous Following Suitcase
Alpin Singh, Cave Spring High School
William Xiao, Northside High School
Teacher sponsor: Mr. Connor Wade

**EM-B 2** Automatic Water Dispenser
Jackson Farrar, Patrick Henry High School
Stella Gillenwater, Patrick Henry High School
Gracie Greer, Patrick Henry High School
Teacher sponsor: Mr. Connor Wade

**EM-B 3** Weight Dependent Automatic Sorting System
Seijin Campbell, Franklin County High School
Kalob Daniels, Lord Botetourt High School
Teacher sponsor: Mr. Connor Wade

**EM-B 4** Handwriting Robotic Arm
Sharmila Balaji, Cave Spring High School
Jeanne-Eugenie Picard, Cave Spring High School
Teacher sponsor: Mr. Connor Wade

**EM-B 5** Self Leveling Car 2.0
Jordan Wattie-Shear, Patrick Henry High School
Teacher sponsor: Mr. Drew Hurst

**EM-B 6** Water Filtration and Movement by Hydrostatic Pressure Model
Charlie Comer, Franklin County High School
Teacher sponsor: Mr. Drew Hurst

**EM-B 7** Automatic Pill Sorter and Dispenser
Kensington Reynolds, Cave Spring High School
Jacob Stewart, Hidden Valley High School
Teacher sponsor: Mr. Drew Hurst

**EM-B 8** Automatic Gutter Cleaner for Geriatric Use
Dominic LaConte, Patrick Henry High School
Jeremiah Morgiewicz, Patrick Henry High School
Teacher sponsor: Mr. Drew Hurst
ENGINEERING MECHANICS C

**EM-C 1** Ball Throwing Arm  
Archit Arora, Staunton River High School  
Conlan McNulty, William Fleming High School  
Teacher sponsor: Mr. Connor Wade

**EM-C 2** Color Sorting Robot Arm  
Christian Chicas-Nolasco, William Fleming High School  
Ginny Matthews, Patrick Henry High School  
Teacher sponsor: Mr. Connor Wade

**EM-C 3** A Self-Tuning Electric Guitar  
Matthew Love, Franklin County High School  
Andrew Michie, Patrick Henry High School  
Teacher sponsor: Mr. Connor Wade

**EM-C 4** Metal Shavings Collection Arm  
Sean Cady, Craig County High School  
Noah Svirsky, Cave Spring High School  
Teacher sponsor: Mr. Connor Wade

**EM-C 5** TacTile: 3D Interactive Haptic Pin Display Using Novel Linear Motor Arrays  
Carson Ray, Cave Spring High School  
Teacher sponsor: Mr. Drew Hurst

**EM-C 6** All Terrain Automatic Rover  
Guillaume Preud’homme, Patrick Henry High School  
Ben Schweitzer, Patrick Henry High School  
Teacher sponsor: Mr. Drew Hurst

**EM-C 7** Braille Teaching Device  
Isaac Olson, Patrick Henry High School  
Ryan Prusakowski, Patrick Henry High School  
Teacher sponsor: Mr. Drew Hurst

**EM-C 8** Automated Safety Paper Cutter  
Kiersten Lauer, Northside High School  
Cora Reid, Staunton River High School  
Teacher sponsor: Mr. Drew Hurst
ENGINEERING MECHANICS D

**EM-D 1** Rock-Paper-Scissors Robot
Isaiah Butler, Patrick Henry High School
Jamal Millner, Patrick Henry High School
Zachary Young, Patrick Henry High School
Teacher sponsor: Mr. Connor Wade

**EM-D 2** Simulating a Game of Odds and Evens
Samuel Dandridge, Patrick Henry High School
Anam Neopaney, Patrick Henry High School
Teacher sponsor: Mr. Connor Wade

**EM-D 3** Claw & Lift
Alex Burnette, Hidden Valley High School
Parker Sisk, Hidden Valley High School
Teacher sponsor: Mr. Connor Wade

**EM-D 4** Automatic Plant Watering System
Divya Bharati, William Fleming High School
Sophie Tisdale, Franklin County High School
Teacher sponsor: Mr. Connor Wade

**EM-D 5** Biometric Fortress: Enhancing Security with Fingerprint and Eyes scanner Technology
Sanchit Baskota, William Fleming High School
Teacher sponsor: Mr. Drew Hurst

**EM-D 6** Automatic Roof Painting Robot to Reduce Urban Heat and Energy Costs
Chloe DeKorsey, Patrick Henry High School
Teacher sponsor: Mr. Drew Hurst

**EM-D 7** AT-CV Walker (All Terrain Combat Vehicle)
Zachary Easter, Salem High School
Diol Glele, Patrick Henry High School
Teacher sponsor: Mr. Drew Hurst

**EM-D 8** Home Security System
McLure Bailey, Patrick Henry High School
Teacher sponsor: Mr. Drew Hurst
ENIRONMENTAL ENGINEERING/ENERGY

EE 1 Bioremediation of Arsenic Using Different Corynebacterium Biofilms
Michael Aziz, Patrick Henry High School
Joshua Manning, Staunton River High School
Teacher sponsor: Mrs. Joanne Villers

EE 2 Bioremediation of Plastic Using Chaetomium globosum and Arthrobotrys conoides
Anna Favor, Patrick Henry High School
Lydia Goad, Patrick Henry High School
Teacher sponsor: Mrs. Joanne Villers and Mr. Steve Villers

EE 3 The Effect of Different Substrates on the Efficiency of a Waste-Based Microbial Fuel Cell
Anika Parashar, Hidden Valley High School
Teacher sponsor: Mr. Matthew Browning

EE 4 The effect of iron oxide nanoparticles on lipid in Nannocloropsis oculata
Benjamin Ogle, Glenvar High School
Teacher sponsor: Mr. Steve Smith

EE 5 Comparing the efficiency of dye-sensitized solar cells made with different semiconductor nanoparticles
Charlotte Anstey, Patrick Henry High School
Teacher sponsor: Mr. Steve Smith

EE 6 The effect of polysaccharide-based hydrogel beads on the removal of heavy metal ions from water
Claire McCahill, Patrick Henry High School
Teacher sponsor: Mr. Steve Smith

EE 7 Using phytoremediation to reduce the impact of copper(II) ions on aquatic life
Parneet Gill, Salem High School
Teacher sponsor: Mr. Steve Smith
MATERIALS SCIENCE/CHEMISTRY

**MS 1** The Effect of Various Substrates on the Strength of Mycelium-based Building Blocks
Frances Livingston, Patrick Henry High School
Sarah O'Brien, Patrick Henry High School
Teacher sponsor: Mrs. Joanne Villers and Mr. Steve Villers

**MS 2** Removing pollutants from water using modified sodium alginate beads
Evelyn Anderson, Cave Spring High School
Heidi Thompson, Cave Spring High School
Teacher sponsor: Mr. Steve Smith

**MS 3** The effect of drop height, drop angle, and floor material on the pattern of blood spatter
Claire Togo, Patrick Henry High School
Teacher sponsor: Mr. Steve Smith

**MS 4** Two chemical methods for testing lead gunshot residues from two different rounds
Elliott Wiegard, Patrick Henry High School
Teacher sponsor: Mr. Steve Smith

**MS 5** Preparing Bio-based Aerogel and Removing Toxic Dyes from Wastewater
Zoe Silva, Staunton River High School
Teacher sponsor: Mrs. Joanne Villers

**MS 6** Using Montmorillonite Clay to Remediate Algal Blooms
Laila Alam, Lord Botetourt High School
Emily Duncan, Lord Botetourt High School
Teacher sponsor: Mrs. Joanne Villers


**MICROBIOLOGY A**

**MI-A 1** The Stability of Bacillus Strains When Applied on Bare and Avicta Corn Seeds  
Mitchell Deese, Salem High School  
Teacher sponsor: Mr. Brandon Taylor

**MI-A 2** The Effects of Synthetic Peptide, Pineapple Enzymes, and Vinegar on the Growth and Formation of *Staphylococcus epidermidis* Biofilm  
Adison Mayhue, Lord Botetourt High School  
Nicoile Scarlatescu, Hidden Valley High School  
Teacher sponsor: Ms. Cindy Bohland and Mr. Steve Villers

**MI-A 3** The Comparison of Oregano Oil, Penicillin, and Erythromycin on *E. coli* and *B. megaterium*  
Aadesh Mittal, Cave Spring High School  
Teacher sponsor: Mr. Matthew Browning

**MI-A 4** The Effect of Herbs and Gentamicin on *P. fluorescens*  
Julia Batty, Patrick Henry High School  
Maya Olson, Patrick Henry High School  
Teacher sponsor: Mr. Matthew Browning

**MI-A 5** A Comparison of Various Vinegar’s Antibacterial Effect on *E. coli*  
Samuel Glenn, Patrick Henry High School  
Jack O’Keeffe, Patrick Henry High School  
Teacher sponsor: Mr. Matthew Browning

**MI-A 6** The Effect of Citrus Juice and Essential Oil on *R. stolonifer*  
Ella Dickerson, Lord Botetourt High School  
Kinsley Milko, Lord Botetourt High School  
Teacher sponsor: Mr. Matthew Browning

**MI-A 7** The Effect of Streptomycin on *Streptococcus salivarius* in Different Medias  
Maggie Hoover, Lord Botetourt High School  
Lacey Mitchell, Franklin County High School  
Teacher sponsor: Mr. Matthew Browning

**MI-A 8** The effect of common herbal remedies on the growth of *Escherichia coli* and *Staphylococcus epidermidis*  
Sydney Anderson, Patrick Henry High School  
Teacher sponsor: Mr. Steve Smith

**MI-A 9** The effects of chemicals found in fertilizer runoff on the bioluminescence of *Aliivibrio fischeri*  
Daniel Owen-O’quill, Patrick Henry High School  
Teacher sponsor: Mr. Steve Smith
**MICROBIOLOGY B**

**MI-B 1** The Effect of Cocoa Flavanols on *Pseudomonas fluorescens* Biofilm Formation and Quorum Sensing  
Nafisah Izzat, Cave Spring High School  
Anvita Panchumarthy, Cave Spring High School  
Teacher sponsor: Ms. Cindy Bohland and Mr. Steve Villers

**MI-B 2** Investigating the Efficacy of Mechanical, Enzymatic, and Chemical Methods of Candida albicans Cell Lysis with Respect to Wastewater-Based Epidemiology  
Aaron Bhowansingh, Hidden Valley High School  
Teacher sponsor: Ms. Cindy Bohland and Mr. Steve Villers

**MI-B 3** The Effect of Kombucha on *E. coli* and *S. epidermidis*  
Ian Costen, Franklin County High School  
Teacher sponsor: Mr. Matthew Browning

**MI-B 4** The Effect of Different Sugars on the Fermentation of Yeast  
Hayston Chappell, Patrick Henry High School  
Matthew Feldmann, Patrick Henry High School  
Anders Plunkett, Patrick Henry High School  
Teacher sponsor: Mr. Matthew Browning

**MI-B 5** The Effect of Fruit Juices on *E. aerogenes* and *S. marcescens*  
Brodie Eanes, Franklin County High School  
Eli Harl, Franklin County High School  
Teacher sponsor: Mr. Matthew Browning

**MI-B 6** The Effect of Ampicillin and Amoxicillin on *P. fluorescens* and *M. luteus*  
McKenna All, Craig County High School  
Claire (Liz) Morris, Craig County High School  
Teacher sponsor: Mr. Matthew Browning

**MI-B 7** The effect of various nanoparticles on the inhibition of *Staphylococcus epidermidis*  
Nolan Stokes, Patrick Henry High School  
Teacher sponsor: Mr. Steve Smith

**MI-B 8** The effect of carbon nanotubes and heavy metals on *E. coli* and *Bacillus cereus* cultures  
Keely Garri, Franklin County High School  
Teacher sponsor: Mr. Steve Smith

**MI-B 9** The Effect of Fluconazole Compared to Oregano Oil on *M. hiemalis*  
Charlotte Hally, Patrick Henry High School  
Teacher sponsor: Mr. Matthew Browning
MI-C 1 The Effect of Copper II Sulfate on Gene Expression and Evolution of E. coli B.
Riley Beasley, Patrick Henry High School
Teacher sponsor: Ms. Cindy Bohland

MI-C 2 The Effect of Manuka Honey on E. coli
Claire Ricketts, Cave Spring High School
Teacher sponsor: Mr. Matthew Browning

MI-C 3 The Effect of Antimicrobial Herbs on the Growth of E. aerogenes
Darby Kerr, Patrick Henry High School
Izzy Mather, Patrick Henry High School
Teacher sponsor: Mr. Matthew Browning

MI-C 4 A Comparison of the Inhibitory Effect of Azole Antifungals vs. Oregano Essential Oil on C. albicans
Dylan De Meyts, Patrick Henry High School
Christopher Toner, Patrick Henry High School
Teacher sponsor: Mr. Matthew Browning

MI-C 5 The Effect of Apple, Lemon, and Orange Juice on S. marcescens
Carter Biscotte, Salem High School
Jaelin Vernon, Salem High School
Teacher sponsor: Mr. Matthew Browning

MI-C 6 The Effect of Lemongrass Essential Oil on E. coli and S. epidermidis
Max Mizuba, Lord Botetourt High School
Preston Vaughn, Lord Botetourt High School
Teacher sponsor: Mr. Matthew Browning

MI-C 7 The Effect of S. marcescens on A. niger and C. globosum
Hope Dolan, Staunton River High School
Teacher sponsor: Mr. Matthew Browning

MI-C 8 The effect of titanium dioxide nanoparticles on E. coli growth when exposed to ultraviolet light
Molly Caroline Fitzgerald, Patrick Henry High School
Eve Foster, Patrick Henry High School
Teacher sponsor: Mr. Steve Smith

MI-C 9 The effects of silver, copper, and nickel infused gauze on Staphylococcus aureus
Gabrielle Romeo, William Byrd High School
Teacher sponsor: Mr. Steve Smith
PLANT SCIENCES A

PS-A 1 Evaluation of Cuscuta interaction with Arabidopsis thaliana Expressing RUBY Reporter
Hannah Mizuba, Lord Botetourt High School
Kane Reczek, Lord Botetourt High School
Teacher sponsor: Ms. Cindy Bohland and Mr. Steve Villers

PS-A 2 Mycorrhizal Pathways between Quercus alba and Fagus sylvatica
Lex Farmer, Patrick Henry High School
Teacher sponsor: Mrs. Joanne Villers and Mr. Steve Villers

PS-A 3 Determining which cryptochrome gene in A. thaliana exhibits the most growth in the presence of a magnetic field
Meera Raichura, William Byrd High School
Teacher sponsor: Mr. Steve Smith

PS-A 4 Allelopathic effects of M. oreades on L. perenne
Lucy Atwood, Patrick Henry High School
Emily Dewire, Patrick Henry High School
Teacher sponsor: Mrs. Tracy Jenkins

PS-A 5 The Allelopathic Effects of G. tagetes Leaf and Stem Filtrate on B. Rapa Germination
Lucy Laplante, Patrick Henry High School
Sadie Panko, Patrick Henry High School
Teacher sponsor: Mrs. Tracy Jenkins

PS-A 6 The Allelopathic Effect of Tagetes patula Seeds on the Germination of Triticum aestivum L.
Eli Peters, Franklin County High School
Roy Wainwright, Franklin County High School
Teacher sponsor: Mrs. Tracy Jenkins

PS-A 7 The Allelopathic Effect of S. oleracea Organs on the Germination of S. lycopersicum
Vivienne Eaton, Salem High School
Ryan Hubbard, Salem High School
Teacher sponsor: Mrs. Tracy Jenkins

PS-A 8 The Allelopathic Effect of Triticum aestivum on the Germination of Glycine max
Claire Grindo, Liberty High School
Ariana Markham, Northside High School
Teacher sponsor: Mrs. Tracy Jenkins
PLANT SCIENCES B

PS-B 1 The Effectiveness of Biochar in Mitigating Salt Stress on Mung Beans
Jaiden Dann, Lord Botetourt High School
Teacher sponsor: Mrs. Joanne Villers

PS-B 2 The effect of melatonin on Rhizobium-inoculated mung beans
Benjamin King, Northside High School
Teacher sponsor: Mr. Steve Smith

PS-B 3 The effect of a simulated acid deposition on the germination of garden cress seeds
Savanna Johnson, Lord Botetourt High School
Teacher sponsor: Mr. Steve Smith

PS-B 4 The Allelopathic Effect of Camellia sinensis on the Germination of Raphanus sativus
Laine Clements, Patrick Henry High School
Evanjali Wagley, Patrick Henry High School
Teacher sponsor: Mrs. Tracy Jenkins

PS-B 5 The Allelopathic Effects of Raphanus sativus on Zea mays L.
Charles Rucker, Patrick Henry High School
Timothy Yemey, Patrick Henry High School
Teacher sponsor: Mrs. Tracy Jenkins

PS-B 6 The Allelopathic Effect of Tagetes patula on the Germination of Solanum lycopersicum
Trey Hipes, James River High School
Tyler McCarren, Lord Botetourt High School
Teacher sponsor: Mrs. Tracy Jenkins

PS-B 7 Allelopathic Effects of Summer Squash (Cucurbita pepo) on the Germination of Pumpkin (Cucurbita pepo)
Chloe Ferguson, Staunton River High School
Arrington Short, Staunton River High School
Teacher sponsor: Mrs. Tracy Jenkins
PLANT SCIENCES C

PS-C 1 Effectiveness of *Glycine max* on Microplastic Removal from Soil
Josephine Eaton, Salem High School
Teacher sponsor: Mrs. Joanne Villers

PS-C 2 Removal of copper(II) and lead(II) ions from water with *C. demersum*
Aman Mengistu, Cave Spring High School
Teacher sponsor: Mr. Steve Smith

PS-C 3 The Allelopathic Effects of *Helianthus annuus* on the Germination and Growth of *Lactuca Sativa*
Nathan Amos, Franklin County High School
Benjamin Grindstaff, Franklin County High School
Teacher sponsor: Mrs. Tracy Jenkins

PS-C 4 The Effect of *Poa pratensis* (Kentucky Bluegrass) Filtrate on the Germination Rate of *Trifolium repens* (White Clover) Seeds
Kassidy Corker, Patrick Henry High School
Kylie Duke, Patrick Henry High School
Teacher sponsor: Mrs. Tracy Jenkins

PS-C 5 The Allelopathic Effect of *Solanum Lycopersicum* on the Germination Rate of *Brassica oleracea*
Mitchell Blankenship, William Fleming High School
Joseline Hernandez, Patrick Henry High School
Kevin Ly, William Fleming High School
Teacher sponsor: Mrs. Tracy Jenkins

PS-C 6 The Allelopathic Effects of Sunflower (*Helianthus annuus*) on Barley (*Hordeum vulgare*)
Augie Biviano, Floyd County High School
Devin Blankenship, Floyd County High School
Teacher sponsor: Mrs. Tracy Jenkins

PS-C 7 The Allelopathic Effect of Raw *Lactuca sativa L.* on the Germination of *Cucumis sativus L.*
Alex Key, Liberty High School
Sebastian Sowards, Liberty High School
Teacher sponsor: Mrs. Tracy Jenkins
SYSTEMS SOFTWARE A

Mann Patel, Glenvar High School
Caleb Wang, Hidden Valley High School
Teacher sponsor: Mr. Doug Divers

SS-A 2 Helping Children with Learning Disabilities Using Python
Holden Bryant, Franklin County High School
Will Jones, Franklin County High School
Teacher sponsor: Mr. Doug Divers

SS-A 3 Using Machine Learning and Image Recognition to Identify Plant Species
Samuel Crawford, Patrick Henry High School
Seth Perry, Patrick Henry High School
Teacher sponsor: Mr. Doug Divers

SS-A 4 Using Python to Identify Celestial Bodies Observed by Civilian Telescopes
Jacob Jackson, Patrick Henry High School
Lex Stratton, Patrick Henry High School
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SS-A 5 Using Python to Escape the Comfort Zone
Miya Morton, Hidden Valley High School
Teacher sponsor: Mr. Doug Divers

SS-A 6 Converting English Speech to German Text Using Python
Graham Dietrich, Lord Botetourt High School
Teacher sponsor: Mr. Doug Divers
SS-B 1 Investment Diversification and Management with Python
Rishika Sethumadhavan, Cave Spring High School
Teacher sponsor: Mr. Doug Divers

SS-B 2 Using Python to Identify Ghost Jobs
Nathan Bulla, Cave Spring High School
Teacher sponsor: Mr. Doug Divers

SS-B 3 Sentiment Analysis: A Lexicon-Based Approach
Evan Shifflett, Patrick Henry High School
Teacher sponsor: Mr. Doug Divers

SS-B 4 Generating Musical Melodies and Accompanying Chord Progressions Through the Use of Artificial Intelligence
Oliver Luci, Patrick Henry High School
Nikolai Morgiewicz, Patrick Henry High School
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SS-B 5 Using Python to Check for A.I. Generated Paper
Isaac Morris, Craig County High School
Ethan Yeary, Franklin County High School
Teacher sponsor: Mr. Doug Divers

SS-B 6 Creating Different Types of Graphs with Python
Eyad Al-Aromah, William Fleming High School
Teacher sponsor: Mr. Doug Divers
### Category Abbreviations Key

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