ANIMAL SCIENCES A

Third Place
AS-A 2 The Effect of Creatine on the Heart Rate of Daphnia magna
Holden Bryant, Franklin County High School
John (Will) Jones, Franklin County High School

Second Place
AS-A 7 The Effects of Zingiber officinale on the Heart Rate of Daphnia magna
Elliott Wiegard, Patrick Henry High School

First Place
AS-A 5 The Effect of NAP Peptide on the Learning Ability of Different Strains of C. elegans
Leo Halsdorf, Patrick Henry High School

First Place
AS-A 8 The Long-term Effect of Beta-Carotene on Eye Color and Light Sensitivity of Drosophila
Emma Seidel, Patrick Henry High School
ANIMAL SCIENCES B

Third Place
AS-B 2 The Effect of Citrus x aurantium on the Heart Rate of Daphnia magna
Charlotte Anstey, Patrick Henry High School
Stella Gillenwater, Patrick Henry High School

Second Place
AS-B 6 Mortality Rate of Amphipods in Varying Water Temperatures
Irene (Ren) Combs-Cannaday, Patrick Henry High School
Phoenix O'Dell, Patrick Henry High School

First Place
AS-B 1 The Effect of Anti-Inflammatory Drugs on Motility and Development in Mutant Drosophila Models for Sanfilippo Syndrome
Barbara (Ayla) Lampros, Salem High School
Reese Redford, Salem High School

First Place
AS-B 3 The Effect of Lavandula dentata on the Heart Rate of Daphnia magna
Parneet Gill, Salem High School
Aleigha Weeks, Salem High School
ANIMAL SCIENCES C

Third Place
AS-C 2 The Effect of Citric Acid on the Heart Rate of Daphnia magna
Jackson Hall, Patrick Henry High School
Zachary Young, Patrick Henry High School

Second Place
AS-C 1 The Effect of Malathion on the Heart Rate of Daphnia magna
John (Jack) Janiga, Hidden Valley High School
Caleb Wang, Hidden Valley High School

Second Place
AS-C 3 The Effects of Prednisone on Planaria Fission and Growth
Emma Pope, Glenvar High School

First Place
AS-C 5 The Effect of Blue Light on D. melanogaster
Emma Batty, Patrick Henry High School
Annika Plunkett, Patrick Henry High School
BEHAVIORAL AND BIOMEDICAL SCIENCES

Third Place
BB 2 Testing the Cold Tolerance of Transgenic C. elegans as a Model for Organ Preservation
Parker Chapman, Franklin County High School
Nate Faulkner, Cave Spring High School

Second Place
BB 4 Investigating Vascular Abnormalities in the Placenta Due to Preeclampsia
Penelope Smith, Patrick Henry High School
Cameron Snyder, Patrick Henry High School

First Place
BB 1 Collagen XIX Point Mutant Leads to Schizophrenia Related Behaviors and Brain Disorder in Mice
Claire Wei, Cave Spring High School

First Place
BB 5 MRI Flow Mapping of Tissue Engineered Lymph Node Stroma: Applications in Response to Interstitial Fluid Flow and Chemotherapy
Sophia Schumaecker, Cave Spring High School
CELLULAR AND MOLECULAR BIOLOGY

Third Place
CM 5 The Effect of Oxidative Stress on Fibroblast Cells Containing the Dsup Gene
Courtney Monard, Hidden Valley High School
Krischal Sutar, William Fleming High School

Second Place
CM 1 The Effect of Blue Light on Opsin3 Gene Expression in the Colon Cancer
Tumor Microenvironment
Grace Harig, Patrick Henry High School
Kira McGinnis, Patrick Henry High School

Second Place
CM 7 Analyzing the Differences in Structure of Preeclamptic and Normotensive
Placental Blood Vessels
Benjamin Blevins, Staunton River High School
Emily Kiser, Staunton River High School

First Place
CM 2 Generation of a Recombinant TSG101 Standard for Normalization of
Extracellular Vesicle Number
Diya Reddy, Cave Spring High School

First Place
CM 4 Cell Cycle and Circadian Synchronization in Colon Cancer HCT116 Cells
Eleanor Little, Patrick Henry High School
CHEMISTRY/ENERGY/MATERIALS SCIENCE

Third Place
CEM 2 The Effect of pH on Copper Pipes
Robert Berry, Patrick Henry High School

Third Place
CEM 4 The Effect of Container Material on the Removal of E. coli from Water by UV Light
Cameron McPhee, William Fleming High School

Second Place
CEM 3 Viability of Different Plant Waste as an Alternative Fuel Source
John Paul (JP) Prusakowski, Patrick Henry High School
Christopher (Durbin) Stevens, Patrick Henry High School

Second Place
CEM 5 The Effect of Various Natural Dyes on Dye-Sensitized Solar Cells
Divya Bharati, William Fleming High School
Autumn Patterson, William Fleming High School

First Place
CEM 1 Removing Pollutants from Water Using Sodium Alginate–Bentonite Beads
Evelyn Anderson, Cave Spring High School
Heidi Thompson, Cave Spring High School
COMPUTATIONAL BIOLOGY

Third Place
**CB 2** A Machine Learning Diagnostic Tool to Predict Alzheimer's Disease using Blood-Based Biomarkers
Maggie Parkhurst, William Byrd High School

Second Place
**CB 1** Retrospective Analysis of ADHD-Associated Genes via Anthropological DNA Sources
Aaron Henion, Cave Spring High School

Second Place
**CB 6** Determining the Applicability of Peripheral Blood Biomarkers for Lung Adenocarcinoma Diagnosis
Griffin Yakob, William Byrd High School

First Place
**CB 3** Py-CRIT: Python Cancer RNA Interference Tool
Brayden Whitlow, Franklin County High School
Timothy Wilson, James River High School

First Place
**CB 4** The Phylogenetic Relationship of Ctenophores with Respect to Other Basal Metazoan Clades
Brett Smith, Lord Botetourt High School
EARTH AND ENVIRONMENTAL SCIENCES

Third Place
ES 2 Cover Crop Effect on Soil Microbial Diversity
Luke Sumner, Franklin County High School

Third Place
ES 8 The Effect of Redlining on Soil Microbial Diversity
Jefferson (Aidan) Callis, Patrick Henry High School

Second Place
ES 1 The Effect of Inorganic and Organic Fertilizers on the Growth of Raphanus sativus and Eutrophication
Sydney Anderson, Patrick Henry High School
Margaret (Maggie) Jarrett, Patrick Henry High School

First Place
ES 6 The Effect of Iron Oxide in Marine Sediment on the Adsorption of Arsenic
Meribel Pan, Hidden Valley High School
ENGINEERING MECHANICS A

Third Place
EM-A 9 Robotic Pipette
John Aziz, Patrick Henry High School
Margaret Kauffman, Patrick Henry High School

Second Place
EM-A 6 Improving the Road System in Franklin County Virginia
Benjamin Dye, Franklin County High School

First Place
EM-A 1 Ultrasonic Sensing Belt for the Blind
Caroline O'Keeffe, Patrick Henry High School
Elisabeth Tershak, Patrick Henry High School

First Place
EM-A 5 Automatic Color Based Sorter
Samuel Crawford, Patrick Henry High School
Seth Perry, Patrick Henry High School
ENGINEERING MECHANICS B

Third Place
EM-B 2 Fingerprint Scan Door Lock Mechanism  
Diol Glele, Patrick Henry High School  
Dominic LaConte, Patrick Henry High School

Third Place
EM-B 6 Mechanical Jar Opener  
Keely Garri, Franklin County High School  
Adison Mayhue, Lord Botetourt High School  
Nicole Scarlatescu, Hidden Valley High School

Second Place
EM-B 5 Water Serving Aid  
Guillaume Preud'homme, Patrick Henry High School  
James (Ben) Schweitzer, Patrick Henry High School

First Place
EM-B 3 Demonstrating American Sign Language through the Use of a Mechanical Hand  
Tristen (Jack) David, Franklin County High School  
Falan Peters, Lord Botetourt High School
ENGINEERING MECHANICS C

Third Place
EM-C 1 Golf Ball Claw Machine
Seth Caldwell, Franklin County High School
Jacob Stewart, Hidden Valley High School

Second Place
EM-C 2 Automatic Key Turner
Russell (McLure) Bailey, Patrick Henry High School
John (J.B.) Clements, Patrick Henry High School

Second Place
EM-C 4 Self Controlled Extinguisher
Sanchit Baskota, William Fleming High School
Jacob Jackson, Patrick Henry High School
Jeremiah Morgiewicz, Patrick Henry High School

First Place
EM-C 5 Testing the Strength of a Simple Magnetic Gear
Canaan (Cane) Fetzer, Cave Spring High School
Coleman Grindstaff, Franklin County High School
ENGINEERING MECHANICS D

Third Place
**EM-D 2** Object Detecting and Avoiding Self-Driving Car
Titus Counihan, Patrick Henry High School
Tristan Kerr, Patrick Henry High School

Second Place
**EM-D 6** Bacteria Plate-Swabbing Arm
Daniel Han, Cave Spring High School
Kiersten Lauer, Northside High School

First Place
**EM-D 3** The Application of Robotic Arm Swarm Behaviors for Autonomous Construction Tasks
Carson Ray, Cave Spring High School
Kane Reczek, Lord Botetourt High School

First Place
**EM-D 7** Roof Painting Robot
Chloe DeKorsey, Patrick Henry High School
Faith Kuehl, Patrick Henry High School
ENVIRONMENTAL ENGINEERING

**Third Place**
**EE 1** The Study of the Bioremediation of Copper by E. coli K-12  
Bailey Barker, Patrick Henry High School  
Riley Beasley, Patrick Henry High School

**Second Place**
**EE 3** The Bioremediation of Perfluorooctanoic Acid by Pseudomonas putida  
Aidan Mayhue, Lord Botetourt High School  
Seth Richards, Lord Botetourt High School

**First Place**
**EE 4** The Application of Interpolymer Complex Hydrogels in the Removal of Aqueous Heavy Metal Pollutants  
Ainsley Robertson, Cave Spring High School
MICROBIOLOGY A

Third Place
MI-A 1 The Effect of Transformed L. acidophilus on E. coli
Jamal Millner, Patrick Henry High School
Daniel Owen-O'quill, Patrick Henry High School

Third Place
MI-A 6 The Effect of Herbal Essential Oils on B. subtilis
Caroline (Gracie) Greer, Patrick Henry High School
Claire McCahill, Patrick Henry High School

Second Place
MI-A 3 Engineering Stable Carotenoid Producing Yeast for Bread Leavening
Keaton Lucas, Lord Botetourt High School

First Place
MI-A 5 The Effect of Nanoparticle Size on Protection from Ultraviolet Radiation
Raimee Sykes, Lord Botetourt High School
MICROBIOLOGY B

Third Place
**MI-B 2** The Antibacterial Effects of Acetic acid on *E. aerogenes*
Isaiah Butler, Patrick Henry High School

Second Place
**MI-B 3** The Effect of White Ginger and Chili Pepper on *S. macescens*
Gabrielle (Gabby) Harig, Patrick Henry High School
Nolan Stokes, Patrick Henry High School

Second Place
**MI-B 8** The Effect of Cannabidiol Oil & Distillate on *P. fluorescens*
Michael Aziz, Patrick Henry High School

First Place
**MI-B 5** The Antibacterial Properties of Metal-Impregnated Fabrics
Laila Alam, Lord Botetourt High School
Emily Duncan, Lord Botetourt High School
MICROBIOLOGY C

Third Place
MI-C 3 The Effect of Microcargo on Chemotaxis of D. discoideum Towards cAMP
Mitchell Deese, Salem High School

Second Place
MI-C 7 The Effects of Various UV Filters on the Bioluminescence of Aliivibrio fischeri
Mieko DeKorsey, Patrick Henry High School

First Place
MI-C 2 The Effects of Aminoglycoside & Beta-Lactam Antibiotics on S. marcescens
Emma Baldwin, Salem High School

First Place
MI-C 5 Investigating the Use of Various Essential Oils to Create Antimicrobial Starch-Based Bioplastics
Ayden McNulty, William Fleming High School
PLANT SCIENCES A

Third Place
PS-A 8 A Study of the Allelopathic Effect of Habanero and Anaheim Peppers on Dandelion Seeds
Samuel Dandridge, Patrick Henry High School
Anam Neopaney, Patrick Henry High School

Second Place
PS-A 1 The Study of the Allelopathic Effect of Lavender Tea on Leek Seed Germination
Kaleb Humerickhouse, Cave Spring High School
Alpinveer (Alpin) Singh, Cave Spring High School

Second Place
PS-A 2 A Study of the Allelopathic Effect of T. aestivum on the Germination and Radicle Growth of D. sanguinalis Seeds
Chloe Herold, Hidden Valley High School
Jeanne-Eugenie Picard, Cave Spring High School

First Place
PS-A 6 The Effect of Heat and Water Stress on the Germination of Seeds of Brassica
Alexander (Lex) Farmer, Patrick Henry High School
PLANT SCIENCES B

Third Place
PS-B 6 A Study of the Allelopathic Effect of Leek Leaves on Wheat Seeds
Nafisah Izzat, Cave Spring High School
Anvita Panchumarthy, Cave Spring High School

Second Place
PS-B 3 The Study of the Mutual Allelopathic Effects of Alfalfa and Tomato Seeds.
Josephine Eaton, Salem High School
Claire Rawlins, Salem High School

First Place
PS-B 4 The Effects of Neodymium Magnets on Plant Growth and Germination
Meera Raichura, William Byrd High School

First Place
PS-B 10 The Effect of Winter Rye Grass Extract on Haustoria Formation by Dodder on Tomato
Hannah Mizuba, Lord Botetourt High School
SYSTEMS SOFTWARE A

Third Place
SS-A 1 Python One-Time-Pad Encryption
Maddox Barry, Glenvar High School
Sean Cady, Craig County High School

Third Place
SS-A 3 Handwriting Recognition in Python
Sharmila Balaji, Cave Spring High School
Hana Sageer, Hidden Valley High School

Second Place
SS-A 4 Python Study Aid
William (Alex) Burnette, Hidden Valley High School
Parker Sisk, Hidden Valley High School

First Place
SS-A 5 Using Python to Optimize Overland Logistics
Michael (Brenden) Hartung, Northside High School
SYSTEMS SOFTWARE B

Third Place
SS-B 3 Converting Image to Sound Using Pixel Data
Kaeli Berry, James River High School

Third Place
SS-B 6 Language Translator with Text-To-Speech Generator
Seijin Campbell, Franklin County High School
Kalob Daniels, Lord Botetourt High School

Second Place
SS-B 2 Price Comparison Aggregator in Python
William Henderson, Franklin County High School
Jeremiah (Chase) Noel, Franklin County High School

First Place
SS-B 4 Block Attack: The Karate Simulation Experience
Tyler VanDyke, Craig County High School