# Montgomery County Science Fair 2017

**Fair: March 17th & 18th**
FDA White Oak Campus
10903 New Hampshire Ave, Silver Spring

**Award Ceremony: March 19th**
Montgomery Blair High School
51 University Blvd E., Silver Spring

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Science MONTGOMERY

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| **Fe-Iron ($150-$499)** | Anonymous<br>Dongbo Wang, Ph.D.<br>Jan Linkenhoker, DVM, MSPH<br>Raghavan Venkat, Ph.D.<br>Someet Narang, Ph.D.<br>United States Nuclear Regulatory Commission |
| **Friends of ScienceMONTGOMERY (Up to $149)** | Alicja Dabrowska Brown<br>Angelique Bosse<br>Anne Merrell<br>Aprajita Srivastava<br>Christopher Cochran<br>David Hokey, Ph.D.<br>Eric Afoakwah, Ph.D.<br>Laura Lee Johnson, Ph.D.<br>Nuray Anahtar, AIA<br>Patricia Miller<br>Ram Narula<br>Robyn Bent<br>Shelley Kluska<br>Valerie Miller, Ph.D. |

**Program Cover Art & Design:** Design: Gabrielle Cusimano & Someet Narang; Image courtesy of Steve Beats, original design.
**Description:** Artistic arrangement of fossilized diatoms from Oamaru, New Zealand positioned by hand into 1.3mm circle captured using bright-field microscopy at 10x magnification, focus stacking of 19+ images. Diatoms, silica-shelled phytoplankton, have been the subject of microscope-aided artistic works since the 1800s. Intricate works can include thousands of hand-placed pieces. Diatoms are used as biological indicators of climate change and have recently become the subject of drug delivery research due to advantageous qualities of their silica shells.


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# 2017 ScienceMONTGOMERY Fair Schedule

www.ScienceMONTGOMERY.org

**Food and Drug Administration, White Oak Campus,**
**10903 New Hampshire Ave.**
**Silver Spring, MD 20993**

## FRIDAY, MARCH 17, 2017

| | |
|---|---|
| 4 PM – 9 PM | Student Project Set-Up: Set-up display boards and go through Safety Inspection at FDA White Oak Campus. Mentors, teachers, family members, and friends of Fair Participants are welcome to view the projects. |

## SATURDAY, MARCH 18, 2017

| | |
|---|---|
| 9:00 AM – 9:45 AM | Judges Preview Period (No students present) |
| 9:45 AM – 10:00 AM | Judges Meeting (Mandatory) |
| 10:00 AM – 12:00 PM | Judges Preview Period (No students present) |
| 12:15 PM – 1:00 PM | Students admitted |
| 1:00 PM – 4:00 PM | Student Interviews: All Judges, all grades; Students must stay until end of all judging |
| 4:00 PM – 5:00 PM | Project Removal: All projects must be removed by 5 PM or they will be discarded. |

## SUNDAY, MARCH 19, 2017

| | |
|---|---|
| 2:00 PM – 4:00 PM | Awards Ceremony at Montgomery Blair High School, 51 University Blvd E, Silver Spring, MD 20901 |
| 4:00 PM – 5:00 PM | Meeting with ScienceMONTGOMERY High School International Science and Engineering Fair (ISEF) Winners and First Runner-up and their families, about trip to Los Angeles, CA for ISEF |

# FOOD AND DRUG ADMINISTRATION (FDA)

# SCIENCE CENTER

## WHITE OAK CAMPUS,

## SILVER SPRING, MD

# IS A PROUD SPONSOR OF THE 2017 MONTGOMERY COUNTY SCIENCE FAIR

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MRIGlobal is proud to support this year's Montgomery Area Science Fair and salutes the intelligence, inventiveness, and ingenuity of all the participating students.

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# MONTGOMERY AREA SCIENCE FAIR ASSOCIATION

Welcome to the Montgomery County Science Fair!

ScienceMONTGOMERY congratulates and applauds the students who participated in the 2017 Montgomery County Science Fair. We hope that conducting these science projects and presenting the hard work that went into them was an enjoyable and valuable experience.

The Montgomery County Science Fair brings together scientists, engineers, mathematicians, educators, parents, and young student scientists from Montgomery County. ScienceMONTGOMERY provides a venue for competition and research presentation among hundreds of students from public, private, and home school affiliations in grades 6 through 12. We provide cash prizes for project excellence through our numerous Category Awards. Complementing these are a large number of Community Awards generously provided by various business, scientific, professional, and educational organizations, and US Government agencies. Students are competing for more than $40,000 worth of prizes in the form of cash, scholarships, internships, travel, banquets, bonds, books, certificates, medals, and merchandise. As an affiliate of the Intel International Science and Engineering Fair (ISEF), ScienceMONTGOMERY also awards fully funded travel scholarships to four projects to compete in the 2017 International Science and Engineering Fair in Los Angeles, CA.

ScienceMONTGOMERY is a 501(c)3, nonprofit, all volunteer organization which relies on generous sponsors to fund the county-wide fair competition each year. For the thirteenth consecutive year, MedImmune serves as our premier sponsor, for which we are most grateful. We also are thankful for the generous support of Information Innovation, Inc., Northrop Grumman and the United Therapeutics Corporation. Other major sponsors are MRI Global, and the Food and Drug Administration.

The all-volunteer ScienceMONTGOMERY Board of Directors wishes to thank each of the organizations and individuals listed in this program for making the Fair possible. Every year, we are indebted to the more than 200 volunteer judges who painstakingly evaluate projects and encourage students' further pursuit of scientific understanding. All of our sponsors, judges, and volunteers make the Fair possible, and we thank you.

I would like to personally thank and acknowledge the ScienceMONTGOMERY Board members who have contributed significant talent, time, and resources late at night, after work, on weekends, and in good and bad weather to make the Fair happen. I also want to thank the parents, teachers, mentors, and sponsors who supported and encouraged Fair participants.

Finally, and most importantly, I want to thank all of the student participants for their hard work, dedication, enthusiasm, passion for science, and willingness to be part of the Montgomery County Science Fair. I sincerely hope this has been a rewarding, valuable, and unforgettable experience that you will carry with you in your careers.

Jan Linkenhoker, DVM, MSPH
Fair Director
March 2017

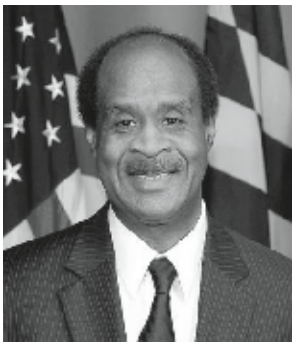
*We at ScienceMontgomery would like to thank*

# *Adam Berger*

*for his generosity, dedication and continuing support.*

OFFICE OF THE COUNTY EXECUTIVE
ROCKVILLE, MARYLAND 20850

Isiah Leggett
*County Executive*



March 3, 2017

Dr. Jan Linkenhoker
Fair Director
*Science*MONTGOMERY
Montgomery Area Science Fair Association

Dear Dr. Linkenhoker:

Montgomery County supports and applauds *Science*MONTGOMERY and your ongoing efforts to encourage interest in science throughout our community. Programs like yours help nurture and expand Montgomery County's longstanding national and international prominence in the life sciences and technology fields. The countywide Science Fair annually attracts hundreds of Montgomery County public and private school students and we are very proud to support your mission to celebrate performance in science education throughout the County.

Now more than ever, Montgomery County is doing all it can to ensure a strong, vibrant economy and healthy, sustainable communities for future generations. Maintaining one of the nation's highest performing K-12 public school systems is essential to these goals, and the talented and dedicated students being recognized this year illustrate our success in this area.

I commend the important contributions you and *Science*MONTGOMERY make within the community, and applaud those businesses that pledged their support to recognize and honor the talents and achievements of our youth.

Sincerely,

Isiah Leggett
County Executive

# MONTGOMERY AREA SCIENCE FAIR ASSOCIATION

Montgomery Area Science Fair–2017
FDA Science Center, White Oak Campus, 10903 New Hampshire Ave, Silver Spring, MD

## OFFICERS AND BOARD, MONTGOMERY AREA SCIENCE FAIR ASSOCIATION

**President:** **Dongbo Wang, Ph.D.**
*FDA*

**Secretary:** **Eric Afoakwah, Ph.D.**
*GlaxoSmithKline*

**Fair Director:** **Jan Linkenhoker, DVM, MSPH, DACLAM**
*NIH*

**Treasurer:** **Christopher Cochran**
*Walter Johnson High School*

## BOARD MEMBERS

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*NOA Architects*

**Yavuz Anahtar, RA**
*NOA Architects*

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**Robyn Bent**
*NIH*

**Angelique Bosse**
*Montgomery Blair High School*

**Alicja Dabrowska Brown**
*MedImmune*

**David Hokey, Ph.D.**
*Aeras*

**Laura Lee Johnson, Ph.D.**
*FDA*

**Shelley Kluska**
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*Ridgeview Middle School*

**Patricia Miller**
*MCPS Teacher (Retired)*

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**Someet Narang, Ph.D.**
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**Aprajita Srivastava**
*Netransform LLC*

**Raghavan Venkat, Ph.D.**
*MedImmune*

*Persons interested in joining the Science MONTGOMERY Board should contact FairDirector@sciencemontgomery.org*

# AWARDS PROGRAM

**2:00 P. M.**
**Sunday, March 19, 2017**
**Blair High School Auditorium**

| | |
|---|---|
| **Opening of Awards Program and Welcome to ScienceMontgomery** | Jan Linkenhoker, Fair Director<br>Dongbo Wang, President |
| **Presentation of Category Awards*** | Jan Linkenhoker, Fair Director<br>Dongbo Wang, President<br>Raghavan Venkat, Board Member |
| **Presentation of Community Awards*** | Jan Linkenhoker, Fair Director<br>Dongbo Wang, President<br>Raghavan Venkat, Board Member |
| **Presentation of Broadcom and ISEF Awards**** | Dongbo Wang, President |
| **Thank you and Adjournment** | Jan Linkenhoker, Fair Director |
| **ISEF Award Winners Meeting 4:00 PM-5:00 PM** | ISEF Committee and ISEF finalists and parents |

* When called on stage for awards, students will shake hands with board members and community awards representatives on stage and then receive awards off to the opposite side of the stage.

* Please hold applause until all awardees for a given category or community award are presented.

**Broadcom winners will be announced and asked to come onto the stage for Broadcom packets and group photo. After Broadcom winners are dismissed from the stage, the ISEF award winners will be announced and asked to come onto the stage for a group photo.

# Community Organizations Presenting Awards–2017

**Achievers League USA**

**American Industrial Hygiene Association, Potomac Section**

**American Institute of Aeronautics and Astronautics National Capital Section**

**American Society of Mechanical Engineers DC section**

**Biophysical Society**

**Clean Air Partners**

**DC Commissioned Officers Association/ US Public Health Service**

**DC-ANS**

**District of Columbia Chapter - American Meteorological Society**

**Educational Systems FCU**

**Friends of Agricultural Research-Belltsville**

**Geological Society of Washington**

**Graduate Women in Science National Capital Chapter**

**IEEE Washington Section**

**KJW Young Scientists Association**

**Medimmune**

**MIT Club of Washington DC**

**MRI Global**

**National Capital Astronomers**

**NIST Chapter of Sigma Xi**

**OSA and IEEE Photonics**

**Research Directorate, National Security Agency**

**Rockville Science Center, Inc.**

**Sigma Xi (FDA chapter)**

**The Aerospace Corporation**

**The National Capital Area Chapter of the Society of Toxicology (NCAC-SOT)**

**U.S. Nuclear Regulatory Commission**

**United States Naval research Laboratory**

**Washington Junior Academy of Sciences**

**Washington Statistical Society**

**WSSC**

Science MONTGOMERY

# 2017 Update

## Congratulations to our 2016 ScienceMONTGOMERY Grand (ISEF) Prize Winners:

| | |
|---|---|
| **Biology:** | **Jihoon Jang (Poolesville HS)**<br>Development of Peptide-Based Cancer Drugs Targeting the Polo-Box Domain of Polo-like Kinase 1 |
| **Computer Science:** | **Diwakar Ganesan (Poolesville HS)**<br>Investigating Deep Learning for Face Recognition |
| **Engineering:** | **Anurudh Ganesan (Clarksburg HS)**<br>VAXXWAGON: An Innovative "No Ice, No Electric" Active Refrigeration System for Last-Leg Vaccine Transportation |
| **Engineering:** | **Vineet Shah (Poolesville HS)**<br>Collaborative Maze Solving & Map Development via Gestural Communication using Multiple Ground Robots |
| **Alternate: Computer Science:** | **Cherry Zou (Poolesville HS)**<br>A Novel Stylometric Algorithm for Authorship Identification over Online Social Networks |

## Kudos to These Members of our ScienceMONTGOMERY Family For Their Wonderful Accomplishments in the Past Year:

**Intel ISEF 2016 (Phoenix): GoDaddy Forward Thinker Award:** Vineet Shah

**Three Dot Dash 2016 Global Teen Leader:** Anurudh Ganesan

**Association for Computing Machinery/Computer Science Teachers Association Cutler-Bell Prize in High School Computing National Winner:** Cherry Zou

**Goldwater Scholar:** Adam Berger

**University of Maryland College Park Philip Merrill Presidential Scholar:** Adam Berger

**White House Science Fair Presenters:** Neil Davey, Anurudh Ganesan

**National Science Bowl (First Place, team member):** Eric Kienzle

**University of Maryland College Park Chemathon (First Place, team member):** Patrick Chao

**I-SWEEEP:** Energy: Divya Gandla & Aadya Bhakaran (Bronze), Shraeya Madhu (Honors)

**Davidson Fellow:** Anurudh Ganesan

**Broadcom MASTERS Semifinalists:** Shreeya Khurana, Medha Kotti, Sonia Stan

**Maryland BioGENEius Challenge:** Anantha Sriya Reddy (Winner/National Finalist), Dhruv Patel (Second Place), Emily Wang (Third Place)

**Siemens Competition in Math, Science & Technology Regional Finalist:** Garyk Brixi; Semifinalists: Sambuddha Chattopadhyay, Jerry Wu

**Regeneron Science Talent Search: Finalists:** Sambuddha Chattopadhyay, Rohan Dalvi; Scholars: Ethan Chen, Richard Chen, Kathleen Cho, Samuel Ehrenstein, Anurudh Ganesan, Ishan Mundra, Richard Wang, Frederick Xu

ScienceMONTGOMERY

**Each year, ScienceMONTGOMERY alumni return to volunteer at our Fair. Many thanks to these Distinguished ScienceMONTGOMERY Alumni for their key help in making the Fair happen:**

**Melis Anahtar · Melodi Anahtar**
**Adam Berger · Megan Brady**
**Katherine Brizzolara**
**Kuo-Kai Chin · Re-I Chin**
**Stephanie Douglas · Taylor Douglas**
**Jeremy Fallick · Maddie Golding**
**Maggie Glaudemans · Jacob Hurwitz**
**Phanna Iamlek · Sneha Kannan**
**Eric Keen**
**Matthew Kinnard · Josh Klontz**
**Paul Kominers · Scott Kominers**
**Kyle Le · Emily Levine · Daniel Liss**
**Nina Jessica Lu · Reethika Maddenini**
**Gyyoung Oh · Jason Qian**
**Sikandar Porter-Gill · Kenny Rosenberg**
**Nathan Schilling · James Sheperdson**
**Reid Simon · Mike Sousane**
**Haroula Tzamaras · Carmelita Ugarte**
**Jennifer Wang · Louis Wasserman**
**Claire Wortmann · Grace Young · David Zhang**

*We invite all ScienceMONTGOMERY alumni to join us as volunteers at future fairs.*
*To volunteer, email alumni@sciencemontgomery.org*

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# 2017 Category and ISEF Awards Judges

| NAME | AFFILIATION |
|---|---|
| Ms. Abolade Adepiti | |
| Dr. Erin Adkins | NIST |
| Dr. Malini Ahuja | NIH |
| Dr. Kyle Anderson | NIST |
| Dr. Mohammad Ansari | University of Maryland School of Pharmacy |
| Mr. Yezdi Antia | Hughes Network Systems |
| Mr. Diego Arenas | American Institutes for Research |
| Dr. Tatjana Atanasijevic | NIH |
| Ms. Michelle Baird | NIH |
| Dr. RAJDEEP BANERJEE | NCI/NIH |
| Ms. Elaine Bautista | NIH |
| Dr. Nawal Benmouna | Montgomery College |
| Dr. Yotam Blech-Hermoni | NIH |
| Ms. Lynda Bradley | NIH |
| Ms. Melissa Breiner | Aeras |
| Dr. Steven Brooks | NIH |
| Mr. Robert Bruce | |
| Mr. Keith Bullock | The Foundation Schools |
| Dr. Jeffrey Burke | Circulomics |
| Dr. Thomas Calder | NIH |
| Mr. Jack Carmi | |
| Ms. Marilyn Carson | Northrop Grumman |
| Ms. Alejandra Cavazos Saldana | NIH |
| Mr. Rohit Chadha | Tata Consultancy Services |
| Mr. Justin Chang | NIH |
| Dr. Shu Hui Chen | NHLBI/NIH |
| Dr. Swati Choksi | NCI/NIH |
| Dr. Jessica Chu | FDA |
| Dr. Tatiana Claro da Silva | |
| Dr. Camila Coelho | NIH |
| Dr. Kevin Connolly | Retired |
| Dr. Richard Conroy | NIH |
| Mr. Kenan Courtney | |
| Ms. Tina Crosby | FDA |
| Ms. Stephanie Cummings | Medimmune |
| Mr. Jonathan Czisny | Group W Inc |
| Dr. Li Dai NIH | |
| Mrs. Amanda Daniels | MedImmune |
| Mr. Salil Das | Montgomery College |
| Ms. Jeannie David | |
| Dr. Sarah Davis | NIH |
| Dr. Marciela DeGrace | NIH |
| Dr. Jana Delfino | FDA |
| Mr. Jose Francisco Delgado | NIH |
| Mr. Ashutosh Dhanesha | Self Employed IT consultant |
| Mr. Nachiket Dharker | ICF International/ NIH |
| Dr. Lena Diaw | NCI/NIH |
| Dr. Garry Didinsky | Orbital ATK |
| Ms. Merina Elahi | |
| Mr. Thomas Erickson | Northrop Grumman |
| Dr. Mohammed Eslami | Netrias |
| Mr. Stephen Esmacher | Northrop Grumman |
| Dr. Luis Espinoza | NIH |
| Dr. Giovanni Facco | U.S. Nuclear Regulatory Commission |
| Mr. Farshad Farhi | |
| Ms. Sarah Faxel | NIH |
| Dr. Wilmarie Flores | FDA |
| Dr. Qiong Fu | NCI/NIH |
| Ms. Mary Galloway | FDA |
| Mr. Kyle Gallun | Unaffiliated / College student |
| Dr. Narayana Garimella | FDA |
| Mr. Anirudh Gaur | Georgetown University |
| Mr. Alex George | University of Maryland College Park |
| Dr. Jeffy George | HJF |
| Dr. Amalendu Ghosh | FDA |
| Dr. Eleanor Gillette | NIST |
| Dr. Paul T Gilmore | Retired |
| Dr. Valentin Giroux | George Mason University |
| Dr. Steven Godin | Smithers Avanza |
| Mr. Alex Gorbachev | |
| Dr. Kirill Gorshkov | NIH/NCATS |
| Ms. Portia Gough | NIH/NIAID |
| Dr. Melissa Green Parker | NIH |
| Mr. Jon Griffin | |
| Dr. Marie Reine Haddad | NIH |
| Dr. Matthew Haldeman | Navy Physician |
| Dr. Jonathan Hardis | NIST |
| Dr. Jessica Hastie | FDA |
| Dr. Colin Heikes | NIST |
| Dr. Geoffrey Heinzl | FDA |
| Dr. Barry Hinderstein | Retired biologist and dentist |
| Ms. Jennifer Hoekman | FDA |
| Dr. J Terrell Hoffeld | U.S. Public Health Service (Retired) |
| Mr. Larry Hothem | USGS/DOI |
| Dr. Ping Hu | FDA |
| Ms. Marsha-Kay Hutchinson | NIH |
| Mrs. Damilola Ishola | |
| Dr. Mihir Jaiswal | FDA |
| Dr. Yuyoung Joo | NIH |
| Ms. Symone Jordan | NIH |
| Dr. Priya Kannan | MedImmune |
| Dr. Devika Kapuria | |
| Dr. Sukhbir Kaur | NIH |
| Dr. Mehdi Kazemzadeh-Narbat | FDA |
| Mr. Edward Kerns | NIH (retired) |
| Mr. Mohd Mohsin Raza Khan | University of Maryland Baltimore; NIH |
| Dr. Ferdous Khan | Northrop Grumman |
| Dr. Bharat Khurana | |
| Dr. Karin Knudson | NCI |
| Ms. Mary Kombolias | |
| Dr. Sastry Kompella | Navy Research Labs |
| Dr. David Kosub | NIH |
| Mr. David Krell | |
| Dr. Edward Kwee | NIST |
| Dr. Sujoy Lahiri | University of Virginia |
| Ms. Hallie Lappin | |
| Mr. Andrew Lasiter | Qiagen |
| Dr. laura lasiter | American Society for Microbiology |
| Dr. Crystal Lee | NIH |
| Dr. William Lee | Naval Research Laboratory |
| Dr. Chris Lester | Navhealth |
| Dr. Junwen Li | NIST |
| Dr. Caeul Lim | |
| Dr. Dawei Lin | NIH |
| Dr. Dongmei Lu | FDA |
| Ms. Maria Jose Luna | NIH |
| Dr. Subha Madhavan | |
| Dr. Tytus Mak | NIST |
| Dr. Shirin Marfatia | FDA |
| Mrs. Theresa Marth | USDA-ARS |
| Dr. gerald marti | CDRH FDA |
| Mr. Stephen Mason | Johns Hopkins University |
| Mr. Joseph Kevin McKennan | Bioqual, Inc |
| Mr. Kevin McPherson | NIH |
| Ms. Barbara Medvar | |
| Ms. Chun-yan Mi | |
| Mr. Scott Miller | Canon BioMedical |
| Dr. Valerie Miller | NCI/NIH |
| Mr. Jack Morgan | |
| Dr. Sarah Morgan | NIH |
| Dr. Suman Mukhopadhyay | NIH |
| Dr. Ancy Nalli | NIH |
| Dr. Mukil Natarajan | NIH |
| Dr. Kapinga Ngalula | |

## 2017 Category and ISEF Awards Judges *(continued)*

| NAME | AFFILIATION |
|---|---|
| Dr. Andy Nieto | US Army Research Laboratory |
| Dr. Carmelle Norice-Tra | NIH |
| Ms. Stephine Oparaugo | Wecost |
| Mrs. Wendy Ortiz | Northrop Grumman |
| Dr. Sarala Padi | NIST |
| Dr. Sri Vikram Palagummi | NIST |
| Mr. Dakshesh Patel | FDA |
| Dr. Vinay Patil | FDA |
| Dr. Jenny Pena Dias | |
| Dr. Norman Peterson | MedImmune |
| Mr. Sikandar Porter-Gill | Structural Engineering |
| Dr. Savelas Rabb | |
| Ms. Sonia Razaqyar | NIH |
| Ms. Christine Ricci | |
| Dr. Albert Rigosi | NIST |
| Mr. Jeff Rodman | Northrop Grumman |
| Ms. Carolina Rojas Ramirez | NIH |
| Mr. Keith Rosenberger | Northrop Grumman |
| Ms. Sage Roth | |
| Dr. Ian Ryu | NIST |
| Mr. Alok Saha | Northrop Grumman |
| Dr. Upasana Sahu | FDA |
| Dr. Upasana Sahu | FDA |
| Mrs. Sanchez Saint Fleurant | FDA |
| Ms. Leigh Samsel | NIH |
| Dr. Tamika Samuel | University of Maryland |
| Mr. Arthur Samuel | Northrop Grumman |
| Ms. Ajmeeta Sangtani | Naval Research Laboratory/ University of Maryland |
| Dr. Sarmistha Sanyal | FDA |
| Dr. Elizabeth Schoenfeld | FDA |
| Mr. Jeremy Schreier | FDA |
| Dr. Sherri-Gae Scott | FASEB |
| Ms. Ashlee Seldomridge | NIH |
| Ms. Hira Shabbir | NIH |
| Ms. Hetal Shah | NIH |
| Dr. Hamza Shakeel | NIST |
| Mrs. Kathryn Shantz | AstraZeneca |
| Ms. Margi Sheth | AstraZeneca |
| Ms. Marina Shumakovich | University of Maryland |
| Dr. Robert Silverberg | NASA |
| Dr. Pushpendra Singh | Johns Hopkins University |
| Ms. Heather Sonnemann | NCI/NIH/NOB |
| Dr. Corey Stambaugh | NIST |
| Ms. Christina Stephens | NIH |
| Dr. Irina Tiper | FDA |
| Dr. Andriy Tkachenko | FDA |
| Mr. Patrick Tracy | American Nuclear Society |
| Mr. Kendall Umstead | NIH |
| Mr. Demelio Urbano | NIH |
| Dr. Rachel Van Duyne | NIH |
| Dr. Raghavan Venkat | MedImmune |
| Dr. Robert Versluis | Retired DOE |
| Mr. Robert Volpe | USUHS |
| Ms. Hailey Walters | NIH |
| Dr. Jane Wang | |
| Dr. Dongbo Wang | FDA |
| Dr. Jessica Wayt | NIH |
| Dr. David Wei | |
| Dr. Stuart Whitehead | |
| Dr. Changming Xia | FDA |
| Mr. Ravi Yada | NIH |
| Dr. Harish Yadav | Awake society |
| Dr. Amy Yang | |
| Mr. Wyatt Yelverton | Lenovo/Health Information Technology |
| Dr. Luna Zaritsky | FDA |
| Mr. Josh Zaritsky | |
| Dr. Tong Zhou | |
| Mr. Sims Zhou | US DOL |

## *Science*MONTGOMERY Participating Schools-2017

| School | Abbrev | School | Abbrev |
|---|---|---|---|
| Argyle Middle School | AGM | Other | OTH |
| Montgomery Blair High School | BLH | Parkland Middle School | PLM |
| Churchill High School | CHH | Poolesville High School | POH |
| Gaithersburg High School | GBH | Roberto Clemente Middle School | RCM |
| Holy Cross School | HCS | Frost Middle School | RFM |
| Holton-Arms School | HOA | Richard Montgomery High School | RMH |
| Home Schooled | HS | Rocky Hill Middle School | ROM |
| Charles E. Smith Jewish Day School | JDS | St. Andrew Apostle School | SAA |
| Julius West Middle School | JWM | Shady Grove Middle School | SGM |
| Muslim Community School | MCS | Takoma Park Middle School | TPM |
| Montgomery Village Middle School | MVM | Wootton High School | WHO |
| Northwest High School | NWH | | |

## Congratulations to *Science*MONTGOMERY 2017

**Best Wishes from the Kominers Family:**

**Ellen, Bill,**

**Paul (*Science*MONTGOMERY 2006-2008), and**

**Scott (*Science*MONTGOMERY 2005)**

# EXHIBITORS

## STUDENTS IN THE HIGH SCHOOL FAIR

### BEHAVIORAL AND SOCIAL SCIENCES

| | | | |
|---|---|---|---|
| H101 | Identifying and Testing the Effect of Amyloid Precursor Protein A-Beta and Chaperone Protein 7B2 on the Spatial Memory of Mice with Alzheimer's Disease | Anusha Patgiri | POH |
| H102 | Change of Domestic Water Consumption in US from 2005 to 2010 and Associated Socioeconomic Factors | David Yang | CHH |
| H103 | The Utility of Prospect Theory and the Development of a Physiological Explanation for Risk Decision-Making Behaviors Using Electrocardiography | Kathleen Cho | POH |
| H104 | Determining disparities in left and right brain dominance in magnet high school students | Chloe Noh | RMH |
| H105 | Cancer Biology | Marina Salinas-Canas | BLH |
| H106 | Sociology - The missing link between Psychology and Physiology | Sareet Nayak<br>Samarth Nayak | RMH<br>RMH |

### BIOLOGY

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|---|---|---|---|
| H201 | Predicting outcome of Zika virus disease using gene expression in the host brain | Luckshika Arudchandran | POH |
| H202 | Fibrosis in the Spleens of GATA1-low mice | Kevin Boby | POH |
| H203 | The Effects of Farmland Transition to Marsh on Forage Radish (Raphanus sativus L.) | Amy Borton | BLH |
| H204 | Innovative Optimization for Malnutrition Treatment | Garyk Brixi | CHH |
| H205 | The Effect of Multiple Microwave Radiation Treatments on the Average Activation Time for Yeast | Lacy Bryant III | WHO |
| H206 | The effect of hemi-Methylation and Hydroxymethylation of Cytosine on the Binding of USF1 and TCF4 | Shriyash Upadhyay | BLH |
| H207 | The Effect of Temperature on the Digestion of Lipids | Faith Mindy Burton<br>Hannah Lee | BLH<br>BLH |
| H208 | The Effect of Colloidal Copper on the Heart Rate of Daphnia magna | Jason Cao | WHO |
| H209 | Analyzing the Effects of Matrix Architecture and Proteolytic Degradation on Fibroblast and Tumor Cell Migration | Ethan Chen | BLH |
| H210 | Using Catechins To Treat & Prevent Hyperglycemia | Adenike Falade<br>Jordan Wallace | BLH<br>BLH |
| H211 | Decoding Your Genome | Michael Gan | RMH |
| H212 | Construction and Validation of a Reporter to Measure Cellular Autophagy Flux | Harshal Shah | POH |
| H213 | Analyzing the Genetic Relationship Between Ductal and Acinar Prostate Cancer | Divya Gandla | POH |
| H214 | Identification of Cellular Heterogeneity Proxy for the Augmentation of a Postpartum Depression Prediction Model | Winston Grenier | POH |
| H215 | The Optimization of Algae production through the use of a Photobioreactor | Claire Hu<br>Sarah Di<br>Kristi Ng | BLH<br>BLH<br>BLH |
| H216 | The Effect of the Initial Gene Pool on the Characteristics of an Adapted Population | Nathan Kaplan | WHO |
| H217 | Optimizing Primers To Create A Multiplex Forensic Kit | Shreya Khanna | POH |
| H218 | Comparison of Various Automatic Segmentation Software for Lesion Detection in HIV Patients | Chaitali Chitnis | WHO |
| H219 | Tracking RNA Transcription Sites in Live Cell Microscope Images | Justin Kim | POH |
| H220 | BRP SNAP: A New Method For Protein Localization | Kevin Manakkunnel | POH |

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| H221 | Use of Tethered Peptide ELISA to Detect Potential Peptide Markers of Antibody Immunity Directed to Influenza Hemagglutinin | Thanushree Manjunath | POH |
| H222 | A RNA Sequencing Study of Gene Expression in the Liver of Mice | Nidhi Mathew | POH |
| H223 | Analysis: Correlation Between the Population of Water Striders and the Temperature Ratio of Water to Air | Esha Mittal | WHO |
| H225 | Do Plants Have Autism? A Bioinformatic Approach | Surya Perla | WHO |
| H226 | Personalized Statin Therapy and Coronary Atherosclerotic Plaque Burden in Asymptomatic Low/Intermediate Risk Individuals | Siri Ranganath | WHO |
| H227 | The Effect of Low Dosages of Electromagnetic Radiation on Hypoestes phyllostachya (Polka Dot Plant) | Priyanka Ravi<br>Patrick Kim<br>Fucheng Li | BLH<br>BLH<br>BLH |
| H228 | A Spin on Plant Growth for Accelerated Farming Technology | Nadia Roghani | MCS |
| H229 | Effect of Nitrogen on Nannochloropsis Oculata Growth Rate | Kennedy Salamat<br>Alice Turnham<br>Oreet Zimand | BLH<br>BLH<br>BLH |
| H230 | Optical Characterization and Bioavailability of Dissolved Organic Matter of Leaf Leachates from Restored and Forested Delmarva Bay Catchments | Elaine Reed | POH |
| H232 | What are the protein domains in wolframin, an endoplasmic reticulum protein mutated in a monogenic form of diabetes? | Daniel Schaffer | BLH |
| H233 | Fish Identification Using Image Processing-Fish Fingerprinting | Jonathan Simak | RMH |
| H234 | The Effect of Water Purification Methods on Water with Cyanobacterial Spores | Alice Varughese<br>Soumith Gadila<br>Jeremy Zhou | BLH<br>BLH<br>BLH |
| H235 | Variation in Sleep Across Days in Drosophila melanogaster | Katherine Wu | BLH |
| H236 | Chronic Kidney Disease Diagnosis Using Optical Coherence Tomography and Computer Vision | Daojun Xu | POH |
| H237 | The Effects of pH on the Binding and Elution of a Malaria Vaccine Candidate, PVS25M, on an Anion Exchange Chromatography Resin | Cheng Yan Zheng | GBH |
| H238 | Zika Virus Vaccine: Experiments in Improving the Thermostability of a Vaccine Candidate through Lyophilization | Marshall Butler | GBH |
| H239 | Analysis of the role of CluH in mitochondrial homeostasis due to its implications in the PINK-Parkin pathway | Amelia Cherian | POH |
| H240 | Creation of Potential Hybrid-Deficient Mutation of S. cerevisiae RNase H2 | John Ahrens | POH |
| H241 | Replication and Determination of the Expression of the Exopolysaccharide Over an Extended Period of Time in a Specific Mutation of Salmonella Montevideo | Kashif Rahman | POH |

## CHEMISTRY

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|---|---|---|---|
| H301 | Fireproof Resin-Fiber Composite Synthesis | Mehana Daftary | BLH |
| H302 | Determining the relationship between Colony Collapse Disorder (CCD) and percentages of active Propolis compound, Pinocembrin | Jayna John | BLH |
| H303 | Steamed vs. Boiled - Which is Better? | Marzieh Kazemi | MCS |
| H304 | Peptide Standards for Nanoscale Interspin Distance Measurements in Biomacromolecules | Shraeya Madhu | POH |
| H305 | The Fermentation of Yeast in Compare of Polysaccharides to Disaccharide | Reihanha Nasrati | MCS |
| H306 | Design, Synthesis, and Analysis of Mixed-Ligand Metal-Organic Frameworks Using 1,2,4,5-Tetrakis(4-carboxyphenyl)benzene | Wally Niu | POH |
| H307 | Using Biodegradable Materials to Filter Heavy Metals from Water | Esika Savsani<br>Kush Savsani | RMH<br>RMH |

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|---|---|---|---|
| H308 | Dust Chemicals and Exposure | Alex Sherwin<br>Farzad Mustafa | RMH<br>WHO |
| H309 | An Accurate and Cost-Effective Method of Quantifying Soil Organic Carbon Using Hydrogen Peroxide Oxidation | Wendy Shi<br>Cindy Shi | BLH<br>WHO |
| H310 | A Simulation Study of Heavy Metal Adsorption on Graphene-like Monolayers | Olivia Wang<br>Bethany Chen | CHH<br>CHH |
| H311 | Exploring Carbon Isotope Exchange Kinetics Between Carbonate and Carboxylic Acids Under Hydrothermal Conditions on Carbonaceous Chondrites | Juliana Lu-Yang | BLH |

## COMPUTER SCIENCE & MATHEMATICS

| | | | |
|---|---|---|---|
| H401 | Using 3D Modeling to Save our Reefs: Exploring the Accuracy of Reef Assessment Techniques Using Structure from Motion | Allie Battista<br>Clara Benadon | OTH<br>POH |
| H402 | Improving Cognitive Skills in an Aging Population through Memory and Executive Functioning Exercises | Karanbir Chawla | POH |
| H403 | HandSight: On-Body Interaction and Outfit Selection | Chuan Chen | POH |
| H404 | Investigating Android App Data Backup Patterns in Changing APIs | Daniel Chen | BLH |
| H405 | CancerInSilico: Gene Expression Simulation | Raymond Cheng | POH |
| H406 | Attachable Blind Spot Assistance | Nicolas Aparicio-Felix<br>Shivam Amin | NWH<br>NWH |
| H407 | Metrics for Kidney Transplantation | Naveen Durvasula | BLH |
| H408 | Generating and Evaluating Synthetic Malicious Network Flow Traffic for an Enterprise | Matthew Feng | POH |
| H409 | Comparing and Evaluating Information Retrieval Systems for Matching Interest Profiles over a Collection of Tweets | Henry Gao | POH |
| H410 | The Development of Reconnaissance Blind Multi-Chess Strategic Bots | Brittany Goldstein | BLH |
| H411 | Dynamic Reconfiguration in Distributed Systems | Calvin Kinzie | POH |
| H412 | Development of a Discrete Method for the Quantification of Visualized Air Flow in Large Scale Wind Tunnels | Andrew Lent | POH |
| H413 | Improving drug delivery using magnetic nanoparticles | Azeem Mohammed | POH |
| H414 | Using Probabilistic Variables to Optimize Learning of Convolutional Neural Networks | Steven Qu<br>Tesia Shi | BLH<br>RMH |
| H415 | Correlational Analysis of Social Media Churn and Company Stock Fluctuations Using Sentiment Identification | Safiullah Rifai | POH |
| H416 | Identifying Significant Performance Factors in an Unstructured Distributed Data Storage and Retrieval Model | Devin Smedira | POH |
| H417 | Analysis of Bounds and Runtime on the Pollard Monte Carlo Integer Factorization Algorithm | Yash Somaiya | POH |
| H418 | Application of Item Response Theory: Analysis of Roll Call Data via Fused Latent and Graphical Model | Hannah Sun | POH |
| H419 | Enhancing accuracy for group text message response through the selection of appropriate features in a machine learning prediction system | Aneesha Sampath | WHO |
| H420 | Google Glass App for Robotics | Sreya Vangara | POH |
| H421 | Computer Simulation of Protein Folding Using the 3D Hydrophobic-Polar Lattice Model | Richard Wang | POH |
| H422 | Improving a Hypercube Structured Distributed Hash Table | James Wilburn | POH |
| H423 | The Effect of Training Dataset Composition on the Performance of a Neural Image Caption Generator | Abigail Wilson | BLH |

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|---|---|---|---|
| H424 | Development of an Augmented Vision Design Through Finger-Based Interactions for People with Low Vision | Jessica Yin | POH |
| H425 | Development of a Molecular Diagnostics Tool for Evaluating Colorectal Cancer Recurrence Risk | Kevin Zong | POH |

### ENGINEERING

| | | | |
|---|---|---|---|
| H501 | Propagation of Wireless Information in Industrial Environments | Jessica Bhattacharyya | POH |
| H502 | Laser-Free Displacement Detection System Suitable For Detecting Earthquakes | Aaron Liss | JDS |
| H503 | Zapping Mosquitoes with Lasers | Ben Ganelin | WHO |
| H504 | Development of Cost Effective Personal Transportation Device with Recharging Systems | Ryan Needle | CHH |
| H505 | Security System for Children in Cars Using Raspberry Pi | Michelle Tang | BLH |
| H506 | On the Use of Consumer-Grade Electronics for Long-Range Data Transmission | Parth Oza<br>Mitchell Fream | POH<br>POH |
| H507 | The effect of the bending of the knee on the amount of stress placed on the knee | Catherine Rodriguez | BLH |
| H508 | Biochromes in a Photovoltaic System | Melika Sizar | MCS |
| H509 | Designing a Large Modular Omni Wheel | Cole Schneider | POH |

### PHYSICS

| | | | |
|---|---|---|---|
| H701 | Characterization and PID Control of Piezoelectric Microelectromechanical Resonators | Seungkyoon Bong | POH |
| H702 | On T-Reflection via Analytic Continuation in Quantum Mechanics | Sambuddha Chattopadhyay | BLH |
| H703 | Analyzing the Effect of Load on Lithium-ion Battery Performance in NASA's Solar Dynamics Observatory Mission | Kathryn Christensen | POH |
| H704 | Determining if the Sign Problem in Lattice QCD with a Theta term is NP Hard | Derek Colby | POH |
| H705 | Calculating Solar Cells' Efficiency: a Modeling Approach by Comparing AFORS-HET and wxAMPS | Anusha Dixit | POH |
| H706 | Lightning in a Jar | Sri Kanipakala | WHO |
| H707 | Observing Exoplanet Transits | Grace Kim<br>Na Hye Kim | POH<br>POH |
| H708 | Analysis of the quantum nature of light absorption to understand the quantum character of plasmons using computational tools | Caroline Leng | POH |
| H709 | Development and Testing of a Thermal Evaporator for Applications in Photocathode Testing | Ishan Mundra | POH |
| H710 | The Efficiency of Dye-Sensitized Solar Cells using various Natural Dyes | Shreya Shete | POH |
| H711 | The Statistics of Sunspots | Shishir Velma | RMH |
| H712 | The Effect of Temperature on Solar Panels | Sresth Viswanathan | RMH |

## STUDENTS IN THE MIDDLE SCHOOL FAIR

### BEHAVIORAL AND SOCIAL SCIENCES

| | | | |
|---|---|---|---|
| M101 | Parental Influence: How does it affect your behavior? | Janet Ruan | RCM |
| M102 | The Effect of Solving Methods on the Rubik's Cube | Michael Sun<br>Eric Zhang | RCM<br>RCM |
| M103 | Can You Think For Yourself? | Katherine Zalewski | HCS |
| M104 | Essential Oils and Vigilance: The Differential Effect of Lavender and Peppermint Aromas | Isaac Newman<br>Raquel Chaupiz<br>Amanda Li | TPM<br>TPM<br>TPM |

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|---|---|---|---|
| M105 | Does Overplaying Music make one Hate It? | Mark Kokiyelov | TPM |
| M106 | The 2016 Election Results Are In! Is Your Media Usage About the Election Related To Your Stress? | Sara Thomas | SAA |
| M107 | How Color Affects Memory | Pelin Altintas | PLM |
| M108 | How does Music affect your mood? | Grace Edwards | MVM |
| | | Nyah Dames | MVM |
| M109 | Is There Such A Thing As Too Much Gaming? | Monica Escalante | AGM |
| | | Mary Abbago | AGM |
| | | Melisa Sucuzhanay | AGM |
| M110 | Half Full or Half Empty | Jan Haro | HCS |
| M111 | The Correlation Between the Patternicity of Paintings and Stress Levels | Alexandra Poremba | JWM |
| M113 | Multitasking and the Brain | Rohan Bhat | RCM |
| M114 | Rohan's Moral Machine | Rohan Ojha | TPM |

## BIOLOGY

| | | | |
|---|---|---|---|
| M201 | Evaluation of Fresh Cut Flower Preservatives: A Prospective Observational Study | Darya Alimoradi | HOA |
| M202 | The underground cities of ants | Chad Alrawashdeh | RCM |
| M203 | The Effect of Household Chemicals on Drosophila melanogaster | Lana Anderson | TPM |
| M204 | Discovering Genetic Reltionships Using BLAST | Ishaan Antani | RCM |
| M205 | Organic vs. Non-organic Food: An Analysis On Antioxidant Property & Vitamin C Content | Ajeetha Arudchandran | RCM |
| M206 | Which fruits lose water the fastest and in which liquid? | Nisha Athrey | RCM |
| M207 | The Effect of Plasmid Concentration on Bacterial Transformation Efficiency | Eric Wang | RCM |
| M208 | Which Antacid Relieves Heartburn the Best? | Nadia Baten | MCS |
| M209 | The Dog Poo Snafu | Ishaan Bhardvaj | RCM |
| M210 | The effects of magnetism on the motility of zebra danios | Matthew Casertano | TPM |
| | | Andrew Healey | TPM |
| M211 | The Size of Bread | Albert Chen | RCM |
| | | Max Chiu | RCM |
| M212 | The Effects of Temperature and Seasonings on the Proteolytic Function of Fruit Proteases | Daniel Choi | RCM |
| M213 | Fascinating Fingerprints | Donhee Cui | HCS |
| M215 | A Study of the Chemotactic Behavior of Physarum polycephalum | Sanjana Das | TPM |
| M216 | The Accuracy and Effectiveness of a Drug | Roma Dhingra | RCM |
| M217 | More Vitamin C: Now or Later | Akshaj Gaur | RCM |
| M218 | The effect of soap pH on the acidity of skin | Alena Hu | TPM |
| M219 | What are the effects of temperature on future plant growth? | Rebecca Kanda | RCM |
| M220 | Green Thumbs For Everyone | Rashmi Kanipakala | RFM |
| M221 | Does playing video games affect children's heart rate and blood pressure? | Juan Rodriguez-Arraiz | SAA |
| M222 | The Effect of Various Household Substances Against Pathogenic Bacteria | Johann Kuruvilla | RCM |
| M223 | Plant-Water Relation | Daniel Lian | RCM |
| M224 | The effects of different liquids on Basil plants | Jason Liu | RCM |
| | | Kevin Huang | RCM |
| M225 | How does chlorine affect the germination of seeds? | Elizabeth Mai | RCM |
| M226 | Personalized Medicine | Pratyusha Mandal | TPM |
| M227 | Does the Five Second Rule Apply? | Jonathan Nalikka | RCM |

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| M228 | Turn Your Spoil into Soil! | Fatemeh Naghavi | MCS |
| M229 | Stream Monitoring System | Jennifer Owen | RCM |
| M230 | A Brine Shrimp Lethality Bioassay to Compare Toxicity Between Conventional and Green Household Cleaning Products | Sydney Ozbun | RCM |
| M231 | What Is the Best pH Level for Growing Seeds? | Celine Paul | SAA |
| M232 | Biodegrading Polystyrene | Justin Pham | RCM |
| M233 | Are Dark Green, Leafy Veggies Higher in Vitamin C Content Than Their Lighter-Colored Counterparts? | Arpita Raman | RCM |
| M234 | Fingerprint Analysis: A Family Case Study? | Carter Rodia | HCS |
| M235 | How do different solutions affect plant growth? | Mateo Rodriguez | RCM |
| M236 | Effect of Exercise on Blood Glucose | Ishaan Jain | RCM |
| M237 | Who can stop me? | Renita Santhoshkumar | TPM |
| M238 | Effect of Ozone Enrichment on the Growth of Bush Bean Plants | Ronoy Sarkar | RCM |
| M239 | The Effect of Growing Plants in Soil with Established Weeds | Jerry Shen<br>Rithvik Bhogavilli | RCM<br>RCM |
| M240 | Listeria: Truth or Scare | Valentina Simon<br>Rachel Rosenzweig | RFM<br>RFM |
| M241 | Will Simulated Parabolic Reflectors Maximize Plant Growth Efficiency? | Danesh Sivakumar | RCM |
| M242 | The effect of time and location on the sighting of wild animals | Camden Spielman | RCM |
| M243 | The Effect of Liquids with Antibacterial Properties on Streptococcus mutans | Ashley Thommana | TPM |
| M244 | Analyzing Differential Cardiac Behaviors in Doppler Ultrasound and Conventional Heart Rate Measures | Anika Seth<br>Esther Tang<br>Shruti Chauhan | TPM<br>TPM<br>TPM |
| M245 | Effects of the Hoodia Gordonii on the Cerebrum vs Dieting/Exercising | Amruth Nare | ROM |
| M246 | What is the effect of vitamin supplements on plants? | Dev Desai<br>Joseph Jubilee | RCM<br>RCM |
| M247 | Efficacy of Different Cloths and Number of Layers on Filtration of Insoluble Particles and Bacteria From Water | Samantha Rodriguez | TPM |
| M248 | From Genes to Genetic Diseases: What Kinds of Mutations Matter? | Kyra Freeman | AGM |
| M249 | Genes and Genetic diseases: What types of genetic mutations matter? | Elise Ofori | AGM |

## CHEMISTRY

| | | | |
|---|---|---|---|
| M301 | Gatorade vs. Powerade What's the difference | Andrew Adams<br>Eric Jung | RCM<br>RCM |
| M302 | Neutralization of Antacids | Ziyan Ahmed | RCM |
| M303 | How Much Fat is in Your Food? | Anna Anand<br>Serena Choy | RCM<br>RCM |
| M304 | Multi-Layer Lava Lamp | Enrick Baez | RCM |
| M305 | The effect of temperature on the salinity and pH of seawater | Ritwik Behera | RCM |
| M306 | Salt and Ice | Nathan Beukema | HS |
| M307 | Acid Adversity | Sarah Briggs | SAA |
| M308 | Is the water filter in my house effective; and does its efficiency change over time? | Aditya Chattopadhyay | TPM |
| M309 | The Effect of Temperature on the Freezing Rate of Water | Maxwell Chen | RCM |
| M310 | Which Solar Desalination Process Works Best for Making Freshwater? | Tiffany Costa | SAA |
| M311 | Does candle hardness affect burning time? | Rachel Daniels | RCM |
| M312 | Does soil affect water pH? | Jordan De La Rosa | RCM |

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| M313 | Household Cleaners: Toxins in Your Home | Om Desai | RCM |
| M314 | Does adding different materials affect how much water's freezing point is depressed? | Aiden Dullaghan | RCM |
| M315 | Factors for the Efficiency of Solar Water Distillation | Efe Eroz | RCM |
| M316 | Sorbents vs. Oil Spills: Which Sorbent Works Best? | Daniel Fu | RCM |
| M317 | Analyzing Air Quality - An Observational Study | Arun Ghosh | RCM |
| M318 | Do different types of orange juice have different levels of Vitamin C? | Mihir Gupta | RCM |
| M319 | The Way Salt Freezes | Gabrielle Hester<br>Yue Ting Wen | AGM<br>AGM |
| M320 | Whether Castile Soap can be Used to Replace Chemical Cleaners | Frank Horrigan | RCM |
| M321 | Colored Fire | Jason Hu<br>Jason Wu | RCM<br>RCM |
| M322 | Which fruit rots the fastest? | Philip Huang | RCM |
| M323 | Bubble-ology | Bethany Hurt | MVM |
| M324 | Charles' Law: Can Science Prove It? | Abhinav Karthikeyan<br>Pranav Tippa | RCM<br>RCM |
| M325 | Mpemba Effect | Kathleen Kee | RCM |
| M326 | The Effect of Acids on the Rate of Corrosion | Hae Rin Kim | TPM |
| M327 | Does the temperature of an acid solution affect the amount of electric current it generates? | Kyle Kim | RCM |
| M328 | Can Molecular Gastronomy Impact One's Food Choice? | Jacob Kiwanuka | SAA |
| M329 | Does mint really cool things down? | Derik Luc | RCM |
| M330 | UN-Frozen | Saanika Mahashetty | RCM |
| M331 | Counterfeiting Money: Easier Than You Think? | Rohin Marwaha | RCM |
| M332 | What is the effect of the ingredients of a liquid on the time it takes to evaporate? | Teryn Mitchell | RCM |
| M333 | Testing The Electrical Condictivity of Soils Under Certain Conditions | Benjamin Nachod | RCM |
| M334 | Using Citrus Fruits to Create Carbon Dioxide Testers | Namya Nanda | RCM |
| M335 | Does the amount of Vitamin C in a veggie vary if stored in different areas? (ex. fridge, outside, indoors in the shade, etc.) | Alaine Sathuluri | RCM |
| M336 | Battery Life- Which ones last the longest (alkaline or non-alkaline, brand name or generic)? | Maaya Senthilkumar | RCM |
| M337 | Solar-Powered Water Desalination | Laylaa Suliman<br>Aliyyah Roberson | AGM<br>AGM |
| M338 | A Low-Cost, Holistic Water Purification Method to Remove Physical, Chemical and Biological Contaminants | Sujay Swain | TPM |
| M339 | Chromatography | Moiz Uddin | RCM |
| M340 | The acid neutralizing capabilities of brand name antacids vs their generic counterparts | Visesh Uppoor | RCM |
| M341 | The effects of temperature on batteries | Davy Wang | RCM |
| M342 | Filtering Water: The Easy Way | Matthew Wong<br>Nicholas Asante | RCM<br>RCM |
| M343 | Compostable Containers: Testing alternatives to plastic | Gabriel Wu | TPM |
| M344 | The Effect of the Water Source on Water Quality | Tony Wu | RCM |
| M345 | Gel Electrophoresis - Separating Food Dyes | Vivian Xiao | RCM |
| M346 | The Effect of Different forms of Heat on Different Fruits | Alexander Yang<br>Timothy Chu | RCM<br>RCM |

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| M347 | Electrolyte amounts in different gatorade flavors | Kevin Yang | RCM |
| M348 | Substrate City | Gene Yu | RCM |
| M349 | How clean is "clean" water? | Ian Yu | RCM |
| M350 | How to simply protect yourself from mosquitoes using plants | Aditi Gubba | RCM |

## COMPUTER SCIENCE & MATHEMATICS

| | | | |
|---|---|---|---|
| M401 | Testing Hand Dexterity Using a Computer Program | Ishaan Bhardwaj | RCM |
| M402 | What method is the best at mitigating Denial of Service attacks? | Aidan Goettsch | RCM |
| | | Nathan Tang | RCM |
| M403 | Steganography in Practice | Brant Jiang | TPM |
| M404 | Optimizing Policies for a Two-Player Card Game Using Reinforcement Learning | Kaan Kayaalp | TPM |
| M405 | Conway's Game of Life | Solomon Ucko | TPM |
| M406 | Design of a Digital Board Game Platform for Education | Ryan Kim | TPM |
| | | Saurav Pandey | RFM |
| | | Arya Palan | RFM |

## ENGINEERING

| | | | |
|---|---|---|---|
| M501 | Hydropower Assessing the flow of water to create mechanically usable energy to produce electricity | Mykel Bailey | HCS |
| M502 | Hydroponic Radish Growth in a Space-Efficient System | Aviva Bechky | TPM |
| M503 | Engineering an Artificial Pancreas | Siya Behl | RCM |
| | | Eileen Zhang | RCM |
| M504 | Which Bridge Can Hold the Most Weight? | Leo Bian | RCM |
| M505 | Can You Build A Working Flashlight Using The Heat of a Human Hand? | Alexander Chen | RCM |
| M506 | Wind Turbines: The Effect of Blade Angle and Blade Quantity on Power Output | Michael Chu | TPM |
| M507 | Testing Conductor Efficiencies | Owen Cochran | AGM |
| M508 | Automatic Curtains | Caroline Dinh | TPM |
| | | Jennifer Li | TPM |
| M509 | Cheap Water Purification at Home | Ameya Deshmukh | RFM |
| M510 | Can a robot lift and carry a payload over a set course? | Aidan Douglas | RCM |
| M511 | Best houses to withstand natural disasters | Christian Dove | RCM |
| M512 | Hovercrafts | Phoebe Evans | AGM |
| | | Elle Burke | AGM |
| M513 | Piezoelectric Powered Shoe | Shreya Gunda | RCM |
| M514 | Fire Watch: A Tool to Predict Wild Fire | Pranav Hegde | RCM |
| M515 | Solar Desalination | Maya Lall | HOA |
| M516 | Coin Collaboration | Ralph Adrian Jarin | AGM |
| | | Sophia Koelsch | AGM |
| | | Alex Kern | AGM |
| M517 | Electromagnetism Ping Pong | Adam Lederer | AGM |
| | | Jake Ventura-Martin | AGM |
| | | David Diouf | AGM |
| M518 | Bridge Strength | Mulan Liu | RCM |
| M519 | Can Global Warming Make Sound? | Diego Lopez | HCS |
| M520 | Investigation of a Bi-metal Circuit Breaker | Benjamin Martin | SGM |
| M521 | Variation of solar cell power output with changing environmental factors and a prototype to maximize power output | Rajit Mukhopadhyay | TPM |
| | | Ezra Bernstein | TPM |

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| M522 | Solar Oven | Aaron Ouyang | RCM |
| M523 | H2OSaver | Saahith Tupakula | ROM |
| | | Sai Havish Gadde | ROM |
| | | Shreedatta Indur | ROM |
| M524 | C-WORMS (Controllable Worm On-Demand Reversible Modulation System) | Dhruv Pai | TPM |
| | | Joshua Wolfson | TPM |
| M525 | What is the effect of changing the properties of a wind turbine blade on the amount of energy it produces | Srisrujan Penikelapati | RCM |
| M526 | Earthquake Impacts on Different Building Structures | Dale Ren | RCM |
| M527 | How Does Distance Affect Light Intensity? | Ali Reza Salimi | MCS |
| M528 | Community Planning for Efficient Solar Energy Production | Anjali Samavedam | RFM |
| M529 | Bridges, Without Supports | Haaken Schofer | RCM |
| M530 | Multi - Level Farms | Shreyas Soma | RCM |
| M531 | Building an Affordable Home Air Sensor | Christopher Stallard | RCM |
| M532 | Alternative Energy: Microbial Fuel Cells | Sabrina Su | RCM |
| | | Pragya Jha | RCM |
| M533 | How reinforced earth is affected by its building materials | Thokozani Tembo | RCM |
| M534 | No-Electric, Life Saving - Oxygen Concentrator | Sanjit Thangarasu | RCM |
| M535 | Obstacle Avoiding Robotic System to Aid the Visually Impaired | Ayush Varshney | TPM |
| M536 | The effect of different materials on radio transmissions | Joshua Wang | TPM |
| | | Hudson Tao | TPM |
| M537 | Hydroelectricity | Keejay Kim | RCM |
| M538 | Now you see it now you don't! How acidic waters make rocks disappear | Sarai Lazo-Salvador | AGM |
| | | Katiti Kajubi | AGM |

## PHYSICS

| | | | |
|---|---|---|---|
| M701 | Using Magnetism in the process of cleaning oil spills | Brian Aniya | RCM |
| M702 | How does the Design of a Propeller Affect its Efficiency? | Robert Bao | RCM |
| | | Alex Wang | RCM |
| M703 | Hydraulic Jack | Anishka Basheerbad | RCM |
| M704 | How does the Width of the Wire Affect the Strength of an Electromagnet? | Tsegazeab Beteselassie | PLM |
| M705 | The Effect of Temperature on the Elasticity of Rubber Bands | Elizabeth Chu | TPM |
| M706 | Drown Out the Sound | Ethan Convis | HS |
| M707 | The Secret of Stradivarius | Lottie Doughty | TPM |
| M708 | How does cup material and liquid type affect temperature? | Fang Du | RCM |
| | | Brian Xiang | RCM |
| M709 | Flame Resistance | Michael Edwards | RCM |
| | | Nadula Kadawedduwa | RCM |
| M710 | Cleaning Oil Spills | Daniel Espinoza | TPM |
| M711 | What is the Effect of Different Concentrations of Sugar in Gelatin on the Refractive Index of Light? | Noah Ferrara | RCM |
| M712 | Analyzing the Applications of Organic Photovoltaic Cells | Samhitha Gandla | ROM |
| | | Manasvi Jadcharla | ROM |
| M713 | The Effect of an Object's Surface Area on its Aerodynamics | Shankar Haridas | RCM |
| | | Tanuj Shah | RCM |
| M714 | Does the acidity of the electrolyte of a citrus battery affect the amount of power generated? | Stella In | RCM |

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| M715 | The speeds in which different amounts of water evaporates under different heat levels | Jeffrey Jiang | RCM |
| M716 | How Do Certain Materials Affect Radio Waves? | Katharina Kiryutin | RCM |
| M717 | Bouncy Floors | Mikhail Krepets | RCM |
| M718 | What is the effect of density and the material of a ball on the angle of an elastic collision? | Satvik Lolla | RCM |
| M719 | How the Height of a Laser Beam Measures the Content of Sugar in a Liquid | Dineth Meegoda<br>Lucas Gonzalez-Rey | RCM<br>RCM |
| M720 | Is there a connection between optical and gamma-ray emission from an Active Galactic Nucleus? | Lara Ojha | TPM |
| M721 | How will temperature effect the strength of a magnet? | Matthew Owusu | RCM |
| M722 | Magnets and Temperature | Anushka Poddar | TPM |
| M723 | Double Pendulums and their Properties | Eli Qian<br>Christopher Tong | TPM<br>TPM |
| M724 | Calculating the Circumference of the Earth | Arjun Rakheja | RCM |
| M725 | Smoldering Science: Can Your House's Exterior Color Reduce Your Summer Energy Bill? | Cole Rodia | HCS |
| M726 | Electricity VS Temperature | Darius Scott | RCM |
| M727 | Let's Look At Another Angle | Abrar Sheikh | RCM |
| M728 | What the best wind turbine blade dimensions? | Eashan Siddalingaiah | RCM |
| M729 | Investigations in Aerodynamics of Aeroplanes | Carl Stahlberg | RCM |
| M730 | The Search for Wasted Energy | Sonia Stan | RCM |
| M731 | Why is my WiFi Signal so Bad? The effect of different materials and distance on WiFi signal strength | Steven Su | TPM |
| M732 | How does an increase and decrease temperature affect the strength of a magnet? | Sarah Thomas | RCM |
| M733 | Measuring Skyglow (component of light pollution) | Jason Yih | RCM |
| M734 | Bubble-ology | Alex Tong | RCM |
| M735 | Center of Gravity | Lucille Wang | RCM |
| M736 | Does the light from light bulbs increase the air temperature? | Kevin Wu | TPM |
| M737 | How distance affects radiation from electronic devices | Adeline Yu | RCM |
| M738 | The Wonders of Astrogeology | Marah Lewis | AGM |

**Science MONTGOMERY**

***Science*MONTGOMERY's Scientific Review Committee would like to thank the students, teachers, volunteers and all of the local IRBs and SRCs for their efforts**

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## The Montgomery Area Science Fair Association (MASFA)

The Montgomery Area Science Fair Association is the organizational vehicle for the annual county science fair, *ScienceMONTGOMERY*, for public, parochial, private, and home school students in Montgomery County, MD.

The goals of the Association are to:

- •Encourage students to explore science through experimentation and to present their results.
- •Produce a top quality, annual science fair.
- •Raise funds to conduct the fair through personal and corporate contributions.
- •Provide for the top high school winners to attend the Intel International Science and Engineering Fair.

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