30th Anniversary Upstate New York Junior Science and Humanities Symposium

March 12 and 13, 2015
University at Albany

Promoting the Future of Science
Welcome to the 30th Annual New York Junior Science and Humanities Symposium (JSHS)! Plan to be amazed by the hundreds of high school students who demonstrate an extraordinary commitment to scientific research.

We have more than five hundred science research students and teachers from forty-one high schools across New York State attending this year’s symposium.

The sixty-eight students presenting their original scientific research as speaker or poster presenters over the next two days are the finalists from among 500+ talented science research students in upstate New York.

Congratulations to all student presenters whose vision and hard work have brought them to this milestone moment and to the teachers and mentors who form the science research in the high school team.

The research presented today is the result of the students’ hard work and passion for their projects, the guidance of trained teachers and scientist mentors, and the support of family and classmates.

The work of these students will be reviewed and judged by teams of scientist judges with expertise in the fields of research represented at the Symposium. In addition, science teachers serve as teacher judges, moderators and recorder.

This group of volunteer professionals ensures that the presenters’ works are given the full consideration and appreciation they so deserve.

The final five winners of the Upstate NY JSHE receive recognition, and an invitation to the 53rd National JSHS held on April 29 – May 2, 2015 in Hunt Valley, Maryland. The top two winners will present their research at the National JSHS.

We hope you enjoy the next two days of student presentations, special guest speakers, workshops, awards, food, and fun.

This year, we are able to provide three of the final winners at the Symposium with scholarships. First, second and third place winners will be awarded scholarships (1st place: $2,000; 2nd place: $1,500; 3rd place: $1,000) by the U.S. Army, Navy and Air Force, sponsors of the JSHS program.

As part of its ongoing support of JSHS, the American Chemical Society – Corporation Associates will award a $750 scholarship to the student with the most outstanding paper in chemistry.

We gratefully acknowledge the support of our sponsors, listed on page 37, who have made these scholarships and opportunities available to our presenters.

Enjoy the 30th Annual Upstate New York Junior Science and Humanities Symposium!
HISTORY OF JSHS

The Upstate New York Junior Science and Humanities Symposium (JSHS) was founded in 1986. It’s among the most prestigious fora for young scientists to present their original research in a symposium-style format.

Each spring in Albany, NY, young scientists from high schools across New York State present the results of original scientific research before more than five hundred science research students, teachers, mentors and judges. Their work is the culmination of a three year Science Research in the High School program that unites students, teachers and mentors in dynamic research. This program has cultivated future scientists from schools in every region of the state.

The students chosen this year to present at the Upstate NY JSHS are finalists from two regional symposia: one in the Capital District at Burnt Hills–Ballston Lake High School and one in Westchester at John Jay High School. Of the hundreds of students who present their papers at the symposia, only a select number are chosen statewide to present at the Upstate NY JSHS in Albany. This program has inspired hundreds of students to present their papers at the regional symposia.

At the Upstate NY JSHS, one finalist is chosen from each of five scientific disciplines and from these five, a final overall winner is selected. Scholarships are awarded to first, second, and third place winners. First and second place winners are given an expense paid trip to compete in the national JSHS for much larger scholarships and a trip abroad.

Those delegated to move on to the National Junior Science & Humanities Symposium will present their research and posters. Over the past fifteen years, the Upstate New York JSHS has produced winners at the National JSHS.

For more information on the Upstate NY JSHS, visit www.albany.edu/jshs/
# Symposium Schedule

**Thursday, March 12, 2015**

10:00 a.m.

Registration for attendees, speakers, poster presenters and guests *(Outside of Ballroom)*

11:00 a.m.

Speaker presenters load PowerPoints
Poster presenters setup posters in Performing Arts Center (Lab Theatre)

JSHS “Selfies” Scavenger Hunt

12:00 p.m.

Registration, orientation, and lunch for judges, moderators and recorder *(Assembly Hall)*

12:15 p.m.

Symposium opens *(Ballroom)*

*All must attend*

Welcome Remarks by Dr. John Delano, and LCDR Steve Bravo

1:03 – 4:24 p.m.

Concurrent speaker presentations

*(CC 375, Physics 129, D’Ambra Auditorium, Recital Hall, and Studio Theatre)*

4:35 – 6:00 p.m.

Posters judged and deliberation *(Lab Theatre)*

4:30 – 6:00 p.m.

Speaker sessions judged and deliberation *(CC 375, Physics 129, D’Ambra Auditorium, Recital Hall, and Studio Theatre)*

6:15 p.m.

Awards Dinner,
Keynote address by Dr. Samuel Bowser,
Announcements of American Chemical Society (ASC) Scholarship for Best Paper in Chemistry by Dr. Thomas Gray, the Art in Science winner by Dr. Danny Goodwin, & session winners in Ballroom

8:30 p.m.

Students and teachers return to hotel

**Friday, March 13, 2015**

6:30 – 7:45 a.m.

Buffet style breakfast at Hotel

8:15 a.m.

Students and teachers arrive in Campus Center

8:30 a.m.

Judges assemble in the Ballroom

8:45 a.m.

Final Speaker presenters load PowerPoints

9:00 – 10:45 a.m.

Final Speaker presentations in Ballroom

11:00 – 12:00 p.m.

Workshop by Linda Krzykowski, Ph.D.: “Sharing your Research Story: Effective Presentation Skills for Young Scholars” *(Assembly Hall)*

12:15 – 1:45 p.m.

Lunch and announcement of final Upstate NY JSHS winners *(Ballroom)*

1:45 p.m.

Closing remarks

2:00 p.m.

Return trip home
HOW TO GET INVOLVED WITH THE UHS SCIENCE RESEARCH PROGRAM

The Science Research courses offered through the University in the High School Program are derived from a unique research initiative overseen by Dr. Dan Wulff of the University at Albany's Biology Department in conjunction with Mr. Len Behr of the University at Albany (formerly of Stissing High School). Completing an approved training workshop is a required first step for gaining admission into the UHS Program. Once that has been done, teachers must request approval for their science research course curricula by sending a letter to the UHS office stating, in effect, that the workshop has been completed and that they agree to follow the guidelines of the Science Research Program as specified by Dr. Wulff and Mr. Behr. The résumé and training certificate of the high school teacher who will be responsible for monitoring and evaluating students choosing to earn UHS credit must accompany any request for admission into the UHS Program.

UHS Science Research Course Descriptions:

A CAS 109 Intermediate Science Research
Students learn research methodology in the natural and social sciences by accessing scientific databases, by using online bibliographic search techniques, consulting doctoral-level research scholars, developing hypotheses and performing experiments to test them, and by writing research papers and making presentations at scientific symposia. It is expected that the students will have done many of these activities in the prerequisite high school course, and in this course emphasis is placed upon the formulation of hypotheses and initiation of experiments in consultation with mentors. Prerequisite(s): completion of one year of an approved course in science research at the high-school level; permission of instructor. Offered summer session only. Offered through the University in the High School Program only.

A CAS 110 Intermediate Methods of Research
Students learn research methodology in the natural and social sciences by accessing scientific databases by using online bibliographic search techniques, consulting doctoral-level research scholars, developing hypotheses and performing experiments to test them, and writing research papers and making presentations at scientific symposia. It is expected that the students will have done many of these activities in the prerequisite high school course, and in this course emphasis is placed upon performing experiments in consultation with mentors. Students are expected to spend at least three hours per week outside of class. Prerequisite(s): completion of one year of an approved course in science research at the high-school level; permission of instructor; available for year-long course of study only. Offered through the University in the High School Program only.

A CAS 209 Advanced Science Research
Continuation of work undertaken in A CAS 109 or equivalent with emphasis placed upon the completion of experiments in consultation with mentors. Students will consult with their teachers as necessary, but will not meet in a formal classroom period. Prerequisite(s): satisfactory completion of A CAS 109 or completion of two years of an approved science research course at the high school level; permission of instructor; offered summer session only. Offered through the University in the High School Program only.

A CAS 210 Advanced Methods of Research
Continuation of work undertaken in A CAS 110 or equivalent with emphasis placed upon the communication of results. Students are expected to spend at least three hours per week outside of class. Prerequisite(s): satisfactory completion of A CAS 110 or completion of two years of an approved science research course at the high school level; permission of instructor; students must be enrolled throughout an entire academic year obtain credit. Offered through the University in the High School Program only.
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**Congratulations to the students at the Upstate New York Junior Science and Humanities Symposium**

Richard C. Iannuzzi, President  
Andrew Pallotta, Executive Vice President  
Maria Neira, Vice President  
Kathleen M. Donahue, Vice President  
Lee Cutler, Secretary-Treasurer

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JSHS Clarification of Fees

Over the past twenty-nine years the Upstate New York JSHS has grown from a small, under attended Symposium to the large gathering that it is today. The costs of running this endeavor have also changed a great deal due to rising prices and the change in our venue. The money contributed by the Armed Services to run the Symposium has not come close to keeping up with the costs over the years.

Since there has been some confusion regarding the fee structure, we have created this page to remind attendees how the fees are structured. Please read it carefully. It will be our guide, and yours, to setting the costs for your school’s students for the years to come.

For the teacher and the first three students: The flat rate fee is $75.00 if registered before the deadline and $80.00 after that date.

For additional teachers, chaperones, and students: The fee is $60.00 per person if registered before the deadline and $70.00 per person after that date. This includes attendance to the entire Symposium (including presentations and workshops), the first day’s dinner, and the second day’s lunch. It does not include transportation from schools to the Symposium (as well as back home), lodging, and other meals.

For additional visitors the fee is $10.00 per person until the established deadline. After that it increases to $25.00 per person. For those who wish to attend the first day only AND take part in the dinner and festivities, the fee is $25.00 per person regardless of registration date.

If you have any questions about registration fees or the Symposium, please contact our office at uhs@albany.edu.

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We are honored this year to have Dr. Samuel Bowser as our keynote speaker.

Dr. Samuel Bowser is a research scientist for the Wadsworth Center in Albany, New York, an adjunct professor and a research associate for the Biology Department at Skidmore College. He completed his B.S. in Biological Sciences (1979) and his Ph.D. in Cell Biology (1984) at the University at Albany. Dr. Bowser went on to conduct two concurrent studies, one in polar biology at the Scripps Institution of Oceanography (1986), and the second in cell biology at the Wadsworth Center in 1987. After his postdoctoral fellowships, Bowser taught undergraduate-level electron microscopy at the State University of New York at New Paltz, and at Williams College in Williamstown, MA. In 1992 he became a research scientist for the Wadsworth Center for Laboratories and Research in Biophysics (1992-1994), Pathology (1992-1994), and Cell Regulation (1994-2005).

Dr. Bowser has mentored more than 70 undergraduate and high school scholars. He has published 105 peer-reviewed papers and book chapters. His interests are in the evolution and ecology of rhizopod protists, specifically Foraminifera, which are single-celled organisms. Bowser has led numerous research expeditions to Antarctica to research "forams" on the deep-ocean floor, and has shown that there are submarine trees that have more bite than bark. In the *Polish Polar Research*, a new genus of Foraminifera (*Bowseria* spp.), was named “in honor of Dr. Sam Bowser (USA), a protistologist and polar explorer, who has spent many years studying Antarctic monothalamous foraminifera and contributed immensely to [their] knowledge of...biology, ecology and diversity.”

Bowser received the Executive Award for exceptional contributions to K-12 science education by the Science Teachers Association of NY, recognized by US-Advisory Committee on Antarctic Names (ACAN) for his research accomplishments in Antarctica, the William Trager Award for Outstanding Publication in the Journal of Eukaryotic Microbiology, the Antarctica Service Medal of the United States, and the Presidential Scholar award of the Electron Microscopy, just to name a few.

Tonight he will give a talk about the “Ancient Submarine Forests – Trees with more Bite than Bark.”

**University at Albany’s Office of Undergraduate Admissions Table (Outside Ballroom)**

Your choice of college will affect a lot more than the next four years of your life.

This decision will lay the foundation for the person you become—the way you think and question, the friendships and connections you make, and the career path you pursue.

That’s why we have provided you the opportunity to meet with UAlbany’s Undergraduate Admissions. UAlbany is a university that provides academic excellence at a great value, a strong foundation to support its students and prepare them for academic and career success, and valuable, lasting connections among fellow students, faculty and alumni.

*To request more information, visit [www.albany.edu/admissions](http://www.albany.edu/admissions)*
Congratulations to the 2014 Participants of the 29th Annual

Congratulations to the 2015 Participants of the 30th Annual Upstate New York Junior Science and Humanities Symposium
Welcoming Remarks by Dr. John Delano and LCDR Steve Bravo

Dr. John Delano received his Ph.D. in geochemistry at Stony Brook University, and currently holds the rank of Distinguished Teaching Professor at the University at Albany in the Department of Chemistry. He is also a UAlbany Collins Fellow and an Associate Dean for the College of Arts and Sciences that includes ~25 academic departments and ~ 400 faculties. In addition, he is a member of the New York Center for Astrobiology, which is funded by NASA’s Astrobiology Institutes program, at Rensselaer Polytechnic Institute. Prof. Delano has served on, and chaired, numerous review panels for both NASA (e.g., Discovery missions; New Frontiers missions) and the National Science Foundation. His research is funded by NASA, and has resulted in ~61 publications in the professional scientific literature. His current work focuses on the role of minerals in forming prebiotic molecules that could have led to life’s origin and Earth’s history of bombardment by large asteroids in affecting biological evolution.

LCDR Steve Bravo is a commercial and technical leader for General Electric’s Renewables Commercial Operations team. He graduated from the U. S. Naval Academy in 2003 with a bachelor’s degree in ocean engineering, and received his master’s degree in Project Management from the University of Maryland, College Park. LCDR Bravo has held positions as a product manager for GE’s Power Generation and Renewables businesses, as well as the Junior Officer Leadership Program. Bravo has been assigned to various positions within the Navy: Personnel and Assistant Administration Officer with TACRON 21 (2011), Operations Officer for the Weapons Department of the Farragut Technical Analysis at the Office of Naval Intelligence in Washington, DC, and Air Logistics Officer and Tactical Air Control Watch Officer for the Amphibious Readiness Group (2012).

Announcement of the Art in Science Winner by Dr. Danny Goodwin, Associate Professor of Photography and Related Media

Danny Goodwin's photographic, video and installation work has been seen in numerous solo and group exhibitions in the US and Europe, including galleries and museums in New York City, California Belfast, Ireland; Washington, D. C.; London, U.K.; Brussels, Belgium; and Oslo, Norway. Goodwin is a 2005 Fellowship recipient of the New York Foundation for the Arts (NYFA). His publication credits include Influence Magazine, Details Magazine, i-D Magazine, Pierogi Press, The Brooklyn Rail, The New York Daily News, The Washington Post, The Seattle Times, The Ft. Worth Star-Telegram and The Albany Times Union. He is Associate Professor and Head of Photography and Related Media in the Department of Art and Art History at the University at Albany, State University of New York. Previous academic appointments include Purdue University and the Cooper Union School of Art. He received an M.F.A. in Combined Media from Hunter College in 1992 and a B.F.A. in Photography from the School of Art at the University of North Texas in 1989.

Announcement of the American Chemical Society Scholarship for Best Paper in Chemistry by Dr. Thomas Gray, Chair-Elect of the Eastern NY Section –ACS

Dr. Thomas Gray was born and raised in south Florida, spending most of his youth working on a small fishing boat in the Florida Keys. He received his Bachelor's and Master's Degrees from Emory University, and then his Ph. D. at the University of Florida in 1989. Prior to joining the faculty at The Sage Colleges, he worked as a process development chemist for fifteen years at Allied-Signal, Cambrex Corporation, and Albany Molecular Research.
Linda Krzykowski has been at the University at Albany since 1993. She teaches in areas of Human Resource Management, Organizational Behavior and Business Communication. Currently, she is the Assistant Vice Provost for Student Engagement for the university where she is responsible for developing programs to support the high academic achievement of UAlbany’s 13,000 undergraduate students. She also co-teaches the School of Business’ award winning MBA capstone class, G3: Going Green Globally and Business Presentation Skills at the graduate level. She is a consultant to many organizations on communication and leadership issues. Additionally, she teaches at the Universidad del Salvador in Buenos Aires, Argentina and has led MBA students on international business exploration around the world.

As Assistant Vice Provost for Student Engagement, Dr. Krzykowski creates unique programs to connect undergraduate students with faculty. New programs launched at UAlbany include Living-Learning Communities housed in over 15 different schools and departments, discipline-based seminars for new freshmen and transfers, a peer-to-peer education program, and a faculty/student engagement series. Under her leadership, the university instituted a new program to bring faculty/staff advisors to all student clubs, and new roles for faculty in important university traditions.

Dr. Krzykowski was named one of the Women’s Business Council’s Capital Region Women of Excellence and received the President’s Award for Excellence at the University at Albany. She is a member of Phi Beta Kappa, Beta Gamma Sigma (national business honorary fraternity), Omicron Delta Kappa (national leadership fraternity), the Capital Region Human Resource Association, and the American Society for Training and Development among others. She chairs the Board of Visitors for Allegheny College and is past Vice-Chair for Junior Achievement. She is a frequent speaker on executive communication skills.

**Workshop**
**By Linda Krzykowski, Ph.D.**
**Friday, March 13th**
**(11:00 – 12:00 p.m.)**

GENERAL NATIONAL JSHS INFORMATION

On behalf of the research offices of the Department of Defense (DoD), the Academy of Applied Science is pleased to announce the 53rd National Junior Science & Humanities Symposium, scheduled April 29 – May 2, 2015, Hunt Valley, Maryland. The National JSHS will bring together over 230 high school students who qualify for attendance by submitting and presenting original scientific research papers in regional symposia held at universities nationwide. Approximately 160 adult leaders, high school teachers, university faculty, ranking military guests, and others attend to encourage the future generation of scientists and engineers and to celebrate student achievement in the sciences. A full program will be planned in cooperation with our tri-Service hosts and STEM researchers from DoD and federal research and development laboratories in the Greater Washington, D.C. area.

The primary aims of JSHS are to promote original research and experimentation in the sciences, engineering, and mathematics at the high school level, and to publicly recognize students for outstanding achievement. By involving talented students and their teachers in affiliated symposia, and by recognizing students’ research endeavors through scholarships and other awards, JSHS aims to encourage continued interest and participation in the sciences and ultimately to widen the pool of trained scientific and engineering talent prepared to conduct research and development vital to our nation.

**Participation**

All regional symposia student finalists are invited to present their research at the 53rd National JSHS. The top two regional delegates are invited to compete for DoD-sponsored scholarships by presenting their research in oral sessions held on Thursday, April 30. All other regional delegates are invited to present their research in poster sessions held on Friday, May 1. Sessions will be organized by disciplines that are designated by the students during the registration process (abstract and paper submission). All sessions will be held at the Hunt Valley Inn in Hunt Valley, Maryland.

Visit [http://www.jshs.org](http://www.jshs.org) for program highlights and scheduled activities.
JUDGES, MODERATORS & RECORDER

Speaker Judges

Behavioral Sciences
Dr. James Boswell, Department of Psychology, University at Albany
Dr. Christine Wagner, Department of Psychology, University at Albany
Dr. Greg Lnenicka, Department of Biological Sciences, University at Albany
Moderator: Ms. Denise Goodliffe, Science Research Teacher at Edgemont High School
Room Supervisor: Karsten Bischoff, UHS Staff Assistant, Enrollment and Registration

Molecular and Cell Biology
Dr. Robert Osuna, Department of Biological Sciences, University at Albany
Dr. Hua Shi, Department of Biological Sciences, University at Albany
Dr. Haijun Chen, Department of Biological Sciences, University at Albany
Moderator: Ms. Donna Light, Science Research Coordinator of Croton-Harmon High School
Room Supervisor: Michelle Westfall, UHS Secretary

Biomedical Sciences
Dr. Christina Egan, Director, Biodefense Laboratory, Wadsworth Laboratory, New York State Health Department
Dr. Scott Tenenbaum, College of Nanoscale Science and Engineering, University at Albany
Dr. Ben Szaro, Department of Biological Sciences, University at Albany
Moderator: Ms. Maria DeCandia, Science Department Chairperson of Edgemont High School
Room Supervisor: Abigail Jensky, UHS Scheduling/Curriculum and Evaluation

General and Environmental Biology
Dr. George Robinson, Department of Biological Sciences, University at Albany
Dr. Robert Feranec, Curator of Vertebrate Paleontology, New York State Museum
Dr. James (Chip) Kilduff, Department of Civil and Environmental Engineering, Rensselaer Polytechnic Institute
Moderator: Ms. Beth Schoenbrun, Science Research Teacher at Scarsdale High School
Room Supervisor: Debernee Privott, UHS Associate Director for Administration

Physical Sciences
Dr. Matthew Szydagis, Department of Physics, University at Albany
Dr. Tim Lance, Department of Mathematics, University at Albany and NYSERNet
Moderator: Mr. Steven Beltecas, Science Research Teacher at Pelham Memorial High School
Room Supervisor: Elana Stein, UHS Assistant Director/Curriculum and Evaluation

Final Session Judges
Dr. Bruce Dudek, Department of Psychology, University at Albany
Dr. Eric Eisenbraun, College of Nanoscale Science and Engineering, University at Albany
Dr. John Schmidt, Department of Biological Sciences, University at Albany
Dr. Paolo Forni, Department of Biological Sciences, University at Albany
Moderator: Dr. Donald Orokos
Recorder: TBD
Poster Judges

Session 1:
- Mohammed Nasrallah
- Lauren McLaughlin
- Kelsey O’Leary
- Rebecca Butler
- Virginia Facteau

Session 2:
- Jasmine Crunk
- Daniel Bollen
- Rachel Burt
- Jennifer Giza
- Jessica Schultz

Session 3:
- Erin Banks
- Odie Augustin
- Jenny Su
- Kelly Curtin

Session 4:
- Bekah Pierce
- Urvi Patel
- Kayla Griffin
- Samantha Kahn
- Spencer Weintraub

*All judges are University at Albany undergraduate students majoring in a science related subject

Congratulations to the presenters at the
30th Annual Upstate New York Junior Science and Humanities Symposium
for your significant academic accomplishments and contributions to science research

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Campus Map
To Session Room Locations

- **Session:** Behavioral Sciences
  Location: Studio Theatre (Room 068), basement floor
- **Session:** Biomedical Sciences
  Location: Recital Hall, 2nd floor
- **Poster Sessions:** Lab Theatre, 2nd floor

- **Session:** General and Environmental Biology
  Location: Room 375, 3rd floor

- **Session:** Molecular & Cell Biology
  Location: Room 129, 1st floor

- **Session:** Physical Sciences
  Location: D'Ambra Auditorium, 2nd Floor
  Enter Life Sciences through Biology

**Indicates JSHS Participant Route to Session Locations**
**Behavioral Sciences**

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<td>1:30 – 1:42 p.m.</td>
<td>PAC, Studio Theatre</td>
<td>Depression Modulates SIRT1 and SIRT2 mRNA Expression in the Prefrontal Cortex, the Nucleus Accumbens, and the Hippocampus</td>
<td>Elizabeth Keeley</td>
<td>Ossining High School, Ossining, NY 10562</td>
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<td>Teacher: Ms. Valerie Holmes and Mr. Angelo Piccirillo / Mentor: Dr. Jian Feng, Mount Sinai School of Medicine</td>
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Sirtuin 1 (SIRT1) and Sirtuin 2 (SIRT2) have been implicated in the development of depression. However, the epigenetic factors behind their expression in relevant brain regions remain poorly understood. Thus, by utilizing chronic social defeat stress, a mouse model of depression, the present study examined the effect of stress on the expression of SIRT1 and SIRT2 in the key brain regions of stress development, such as prefrontal cortex (PFC), the nucleus accumbens (NAc), and the hippocampus (HIPP). Brain tissues were obtained from mice 48 hours or ten days after experiencing the chronic social defeat protocol, a murine model of depression. Socially defeated susceptible (n=21), resilient (n=21), and control samples (n=21) were analyzed to determine the changes in SIRT1 and SIRT2 mRNA between groups. Real-Time PCR (RT-PCR) was performed to quantify the levels of SIRT1 and SIRT2 mRNAs. We found that both SIRT1 and SIRT2 transcriptions were be significantly higher in susceptible mice than in control mice in the NAc and the PFC regions after 48 hours and ten days (p<.05). However, SIRT1 expression in the hippocampus was significantly lower in susceptible mice than control mice after 48 hours (p<.01). The findings of this research are important for developing novel drug therapies to treat depression through the mediation of SIRT1 and SIRT2 levels.

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<td>Misguiding Messages: Does Post-Event Email Misinformation Influence Text Memory in Teenagers?</td>
<td>Leyla Brittan</td>
<td>Horace Greeley High School, Chappaqua, NY 10514</td>
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<td>Teacher: Dr. Trudy Gessler / Mentor: Dr. Jennifer Mangels, Baruch College</td>
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This study examined the effects of false information provided through email on teenagers’ memories of a previously read passage. It was hypothesized that this information would have a distorting effect on memory, and that information from an authority source would be more likely to cause distortion than information from a peer. Participants aged 14 to 18 read passages, read comments on the passages including both false and true information, and took surveys to measure their memory of the passages. The false information included comments by both a peer and an authority source. Results showed that the distorting information had an effect on participants' true/false answers, but this was a distorting effect for only one passage and a facilitating effect for the other. This may have been due to differences in the overall memorability of the passages. However, the information had a distorting effect on students' free recall of both passages. Additionally, results suggested that misinformation from an alleged source of authority was more influential on memory distortion than misinformation from an alleged peer source.
Parental Feeding Strategies Influence the Risk of Children Developing Obesity
Tess Halpern
Ossining High School, Ossining, NY 10562
Teacher: Mr. Angelo Piccirillo and Ms. Valerie Holmes / Mentor: Kathleen L. Keller, PhD, The Pennsylvania State University

Childhood obesity affects millions of Americans and increases their likelihood of developing life threatening conditions. It has been suggested that the parental feeding strategies of pressure, restriction, and control over child diet can play key roles in the development of obesity. Research on these strategies in relation to child body mass index (BMI) has been limited and ambiguous. This study aimed to determine if a relationship between these parental feeding strategies and child BMI exists. Eighty-six parents of four and five year old children were evaluated for their use of pressure, restriction, and control when feeding their child, using four questionnaires. The height and weight of each parent-child pair was recorded and BMIs were calculated. A positive correlation was found between child BMI and parent BMI ($r = .353, p = .001$). Caucasian parents of females reported higher levels of concern over child diet and weight than parents of males ($p = .009$). Negative correlations were found between parental education level and level of pressure ($r = -.388, p < .001$), and control ($r = -.452, p < .001$), where lower levels of education were associated with higher frequency of the feeding strategies. Higher levels of parental control correlated to lower levels of child enjoyment of food. Higher levels of parental pressure correlated to higher levels of food fussiness. Higher levels of all three parental feeding strategies correlated to higher levels of emotional eating. Overall, the results of this study indicate that the parental feeding strategies of pressure, restriction, and control affect child eating behaviors and impact both short and long term risk of obesity.

The Effects of Task-Induced Stress on Sustained Attention Performance
Omar Hafez
Monroe-Woodbury High School, Central Valley, NY 10917
Teacher: Mr. Jon Decker / Mentor: Dr. Tyler Shaw, George Mason University

Tasks that employ vigilance, or sustained attention, require observers to respond to the infrequent appearance of critical signals. Vigilance is employed in many operational environments such as airport baggage inspection and is also used when monitoring anesthesia gauges during surgery. Vigilance tasks are notorious for elevating stress levels in participants; however, little research has been done to understand the converse relationship, that is, the effects of task-induced stress on vigilance performance. The present study aimed to analyze the effects of moderate psychological stress on performance during an abbreviated sustained attention task. Stress was induced through the socio-evaluative threat produced by the Trier Social Stress Test and was measured using the distress factor from the Dundee Stress State Questionnaire. Analysis of data revealed that the Trier Social Stress Test significantly elevated stress levels when compared to a control group, which suggests that this task may be used as a novel way of inducing stress to examine the effects on cognitive performance. In addition, performance results indicate that the stress induced by the TSST negatively impacted performance accuracy over time. Results are discussed in terms of a cognitive resource theory of vigilance, and practical implications and future research directions are mentioned.
3:18 – 3:30 p.m.

**Pediatric Migraine Associated Vertigo**
Dhanisha Nandigama
Shaker High School, Latham, NY  12110
Teacher: Mr. Nathaniel Covert / Mentor(s) and affiliation: Dr. Jason Mouzakes, and Professor Steven D. Rauch, Albany Medical College

Migraine is a very debilitating chronic disorder in the United States. Migraine Associated Vertigo is characterized by symptoms such as headaches, vertigo, dizziness, nausea, vomiting, or light sensitivity. Statistics show around 70% of school children have experienced a headache at least once a year, and one in every four of these children suffer from recurrent headaches, along with 10% of school children who suffer from migraine (The Migraine Trust). Over 10 percent of these U.S. children experience migraines, exceeding the number of asthma and diabetes patients combined according to the Migraine Research Foundation, making this a widespread condition. The pathophysiology of MAV is not entirely clear, and the diagnostic entity remains ambiguous. The purpose of this research is to establish a link between outside factors that could be a potential cause of the vertigo and migraine in children. In order to correlate the connections between outside factors with vertigo and migraine, a scientific survey has been created. Factors such as weather changes, allergies, stress levels, heredity, conditions such as meniere's disease, vestibular neuronitis, labyrinthitis, perilymphatic fistula, and few more conditions that could be well associated with vertigo were tested. Results show a correlation between gender and five important factors tested.

3:45 – 3:57 p.m.

**Sleep-dependent consolidation of spatial memory changes with aging**
David Leibert
Ossining High School, Ossining, NY  10562
Teacher: Mr. Angelo Piccirillo and Ms. Valerie Holmes / Mentor: Dr. Andrew Varga, NYU Sleep Disorder Center

Sleep plays an important role in spatial memory. Rodent models suggest that disrupting both NREM and REM sleep impairs spatial memory. In humans, studies suggest that NREM sleep helps consolidate spatial memory; the role of REM sleep on spatial memory has not been investigated. A novel sleep apnea model was used to study the impact of REM sleep on spatial memory in humans. Participants with well-treated severe obstructive sleep apnea were tested by navigating a 3D maze before and after a normal night of sleep. On another night REM sleep was disrupted by selectively lowering CPAP settings when the participants entered REM sleep. This was done to be able to compare maze performance before and after a normal night of sleep with maze performance before and after a night of REM disrupted sleep. Participants’ spatial memory improved by 31% in the maze after the normal night of sleep but performance decreased by 5% when REM sleep was disrupted (p<.001). When analyzed with regards to aging, the younger participants improved by 39% (p=.002) on the normal night but did not improve on the REM-disrupted night; older participants improved by 22% (p>.05) over the normal night and by 14% over the REM-disrupted night. We conclude that REM sleep is an important component of the sleep-related improvements in spatial memory and that there are age-related differences in the contributions of REM sleep to spatial memory that bear further investigation.
Generating Mature Beta Cells from Patient-Specific Pluripotent Stem Cells
Stephanie Micucci
Nyack High School, Nyack, NY 10960
Teacher: Ms. Kirsten Kleinman / Mentor(s): Dr. Dieter Egli and Dr. Lina Sui, Columbia University Medical Center

Type 1 diabetes is an autoimmune disease characterized by the autoimmune destruction of one’s insulin-producing, glucose-responsive cells, or beta cells. By generating beta cells from a diabetic’s own somatic cells, these can be used in cell replacement therapy to cure an individual of diabetes. In this study, pluripotent cells were generated from cells derived from the process of human somatic cell nuclear transfer and differentiated to beta cells and transplanted into immunodeficient mice. The efficiency of differentiation was shown to be moderately successful; however, mice with the transplanted cells developed teratomas at the transplantation site. Teratomas from a separate but related experiment were sectioned on microscopy slides with paraffin and analyzed via immunohistochemistry. They were found to express some pancreatic hormones and transcription factors such as insulin and pdx1. Differentiation protocols must be refined to generate more successful beta cells and to prevent the formation of teratomas after cell transplantation.

Generating iPSCs from Human MSCs for Differentiation into Nociceptive Neurons
Elizabeth Sobolik
Sleepy Hollow High School, Sleepy Hollow, NY 10591
Teacher: Ms. Janet Longo-Abinanti, Sleepy Hollow High School / Mentor: Dr. Ge Zhou, MD PhD Regeneron Pharmaceuticals

Induced pluripotent stem cells (iPSCs) have the ability to circumvent issues associated with obtaining specialized cells for in vitro models and revolutionize individualized care. Currently, issues with creating cell models include the risk of jeopardizing the patient’s health while harvesting samples and the limited passage capacity of many desired cell types. This study aimed to create an in vitro model of nociceptors -- neurons responsible for transmitting pain signals from the PNS to the CNS. Four transcription factors (Sox2, Oct4, Klf4, and c-Myc) were transfected on a healthy human mesenchymal stem cells to generate individualized iPSC colonies. After purification, the quality of the iPSCs was assessed using immunofluorescence for the primary antibody Tra-1-60. Once refined iPSCs were generated, the cells were differentiated over 15 days using five small-molecule inhibitors (LDN-193189, SB431542, CHIR99021, DAPT, and SU5402). The successful differentiation of iPSCs into nociceptors was confirmed by the homogenous expression and repression of surface markers Tra-1-60, Nestin, TUJ1, NF, BRN3A, and Peripherin over the 15-day period using immunofluorescence. This study demonstrates that it is possible to generate stable, individualized iPSCs that can be differentiated into a desired cell type for applications in drug screening, disease modeling, and autologous cell-replacement therapies.
Kinase Regulators of MHC Class I Presentation
Jeffrey Tsang
Pelham Memorial High School, Pelham, NY, 10803
Teacher: Mr. Steven Beltecas / Mentor: Dr. Elliott Brea, Sloan-Kettering Institute

Antigen presentation through the Major Histocompatibility Complex I forms the basis of immune recognition of infections, autoimmune diseases, and immunotherapy. Antigens are derived from native or foreign proteins, which are degraded and presented to immune effectors cells. For cancer therapy, of particular interest is the Wilms tumor 1 oncoprotein, which is an intracellular transcription factor that is overexpressed in leukemia and many cancers. WTI is degraded into smaller peptides, of which the RMFPNAPYL peptide is presented on the Human leukocyte antigen (HLA-A0201) receptor. ESK-M, a monoclonal antibody that binds to RMF peptide in the context of HLA, has shown effectiveness both in vitro and in vivo against various HLA-A02 + tumors. Thus, utilizing BB7 antibody as a probe for HLA expression, specific pathways can be identified. Determination of pathways in the MHC-I that lead to sensitivity and resistance to ESKM treatment will be valuable in understanding the role specific gene targets. This may prove vital towards increasing the efficacy of ESK-M by focusing on specific genes that boost HLA expression. Utilization of CRISPR technology to target and knockdown specific kinase regulators can be used to understand how HLA is modulated through these genes and can lead to discovery of other phenotypes.

Investigating the protective effects of interleukin-22 on intestinal epithelium: potential graft-versus-host disease treatment
Juliet Ivanov
Ossining High School, Ossining, NY 10562
Teacher: Mr. Angelo Piccirillo and Ms. Valerie Holmes / Mentor(s): Dr. Alan Hanash, Dr. Caroline Lindemans, Memorial Sloan-Kettering Cancer Center

Gastrointestinal graft-versus-host disease (GVHD) is a severe complication of allogeneic hematopoietic stem cell transplantation in which donor T cells attack host tissues. Immunosuppressants are utilized as a primary therapy for GVHD, however their side effects often inhibit patient recovery. As a result, alternative GVHD treatments are critical. While interleukin 22 (IL-22) deficiency has been linked to worsened GVHD in a murine model, the protective mechanism of IL-22 in the intestine remain unclear. Thus, we aimed to elucidate the effects of IL-22 on intestinal epithelium to determine if IL-22 treatment can improve tissue recovery in GVHD. Three-dimensional murine organoids that mimic intestinal crypt structure in vivo were cultured and treated with recombinant murine IL-22. Subsequently, a novel quantitation technique was used to assess organoid growth. We found that IL-22 increased small intestinal (p<0.0001) and large intestinal (p<0.05) organoid size, indicating increased proliferation and potential protection from GVHD. Additionally, new crypt formation in organoids (p<0.05) and percentages of intestinal stem cells (ISCs; p<0.05) were increased by IL-22. This increased growth was not associated with upregulated transcription of niche-derived intestinal growth factors. It was, however, associated with activation of the IL-22R pathway preferentially in intestinal stem cells (ISCs), suggesting direct effects of IL-22 on ISCs. Furthermore, IL-22 treatment of single ISCs caused increased size (p<0.05) and increased budding (p<0.05) of the resulting organoids. These findings are the first to indicate that IL-22 promotes intestinal regeneration by functioning as an ISC growth factor. Treatment of murine organoids with recombinant human IL-22 also resulted in increased proliferation of intestinal cells (p<0.05), suggesting human IL-22 may be a promising candidate for tissue regeneration therapies for patients with intestinal pathology.
**3:18 – 3:30 p.m.**

**Structural Snapshots of K. lactis Purine Nucleoside Phosphorylase trapped with Transition State Analog Inhibitors**

Samuel Goldman  
Pelham Memorial High School, Pelham, NY, 10803  
Teacher: Mr. Steven Beltecas / Mentor: Dr. Agnidipta Ghosh, Albert Einstein College of Medicine

The use of transition state analogs to inhibit protein and enzyme activity is an extremely powerful application in medical and biochemical disciplines. Purine auxotrophs, organisms that can only obtain purines through salvage, are dependent on the enzyme purine nucleoside phosphorylase (PNP). By using transition state analogs to block the binding site of purine nucleoside phosphorylases, one can effectively destroy large populations of purine dependent cells, and this technique has been applied to treat T-cell cancers. However, with the further expansion of the use of transition state analogs as a medical application, further testing must be done to understand the behavior of these analogs with PNP as it changes and mutates, as it is characteristic of cancerous cells to undergo dramatic and rapid mutation. Such analysis will help to combat against resistance from genetic variations in a population and develop more powerful drugs. This study used the functional assay ThermoFluor and structural analysis x-ray crystallography to understand how a catalytic mutant H98R/S42E of PNP interacted with inhibitors DADMe-ImmH and DADMe-ImmG. It was found that DADMe-ImmG retained high binding stability, however DADMe-ImmH hints at instability due to weaker interactions with the anchoring site.

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**3:45 – 3:57 p.m.**

**Secretion of Organic Compounds from Tissue Engineered Adipose on Silk Scaffolds of Differing Sizes**

Brooklyn Grossbard  
Nyack High School, Nyack, NY 10960  
Teacher: Mrs. MaryBeth Foisy & Mrs. Kirsten Kleinman / Mentor: Dr. David Kaplan, Tufts University

Lithium-iodide cells power implantable medical devices. However these batteries have to be changed often, and so reoccurring surgeries are required for many patients with implantable devices. Biofuel cells would eliminate the need for battery replacement, by powering the implantable medical devices off of the patients own fat. If successful, the biofuel cell would first use fuel from organic compounds that are secreted from tissue-engineered adipocytes, but over time the patient’s own adipocytes would take over. The Kaplan Lab at Tufts University is looking to creating a biofuel cell using adipose tissue that is engineered on silk scaffolds. The purpose of this project was to determine the feasibility of engineering adipocyte cells that secrete concentrations of organic compounds that will be beneficial to the biofuel cell. Scaffolds of differing size and differing culture period were tested for the concentrations of triglyceride, free fatty acid, and glucose. The results from a two way randomized ANOVA found that the differences in concentrations were all significant and that the difference between specific size and culture period groups was significant as well. These results will be used to optimize the scaffold size and cultivation time to achieve maximum fuel potential.
**Assessing the Range of Motion of the Upper Limb in a Modified Box and Block Test**

Emily Grossman  
Croton-Harmon High School, Croton-on-Hudson, NY  10520  
Teacher: Ms. Donna Light-Donovan / Mentors: Dr. Jacqueline Hebert and Dr. Craig Chapman

Used to assess amputee patients, the Box and Block Test (BB Test) is an occupational therapy task that measures the gross manual dexterity of the arm and can be used as a practice tool. In this study, a BB Test was modified from its former configuration with one endpoint and one divider height, to having two possible endpoints (one near, replicating the original task, and one far), and two possible heights (one short divider, replicating the original task, and one tall). Motion analysis was used to quantify differences in range of motion for the shoulder and elbow joints. It was hypothesized that the far drop off area would result in more shoulder range of motion than the near drop off area, and the tall divider would result in more elbow range of motion than the short divider. Motion analysis data from 13 subjects revealed that a farther endpoint caused a significant increase in shoulder range of motion, and a taller divider caused a significant increase in elbow range of motion. The results demonstrate that by making simple changes to the BB Test, amputees can have a more efficient practice tool that better utilizes proximal range of motion of their limb.

**Glutamate Shows Promise as a Protectant Against Neuro-Degeneration in an Epilepsy Model**

Rebecca Hannan  
Ossining High School, Ossining, NY  10562  
Teacher: Mr. Angelo Piccirillo and Ms. Valerie Holmes / Mentor(s): Richard Zeman, Ph.D., New York Medical College

Epilepsy is a neurological disorder that affects 65 million people worldwide and causes neurodegeneration; one third of these individuals do not respond to current treatments. Picrotoxin is an agent that induces a chronic seizure disorder equivalent to epilepsy in *Drosophila melanogaster*, therefore it was used to develop the epilepsy model used in this study. Previously, a memory formation impaired *Drosophila* mutant, Rutabaga, exhibited neuro-protection following neuro-trauma. Thus, memory formation inhibiting drugs were used in this study to counteract the neurodegenerative effects of epilepsy. Treatments of glutamate, AP5, DNQX, potassium chloride (KCl), WIN55,212-2, AM251, ACEA or cycloheximide were used to prevent the neurodegeneration resulting from epilepsy; as a measure of neurodegeneration survival was studied across three time intervals. It was found that glutamate administered throughout the duration of the experiment and at a 25mM concentration offered improved survival compared with the epileptic non-treatment control condition (p < 0.05). Targeting specific glutamate receptors did not further improve survival (p < 0.05). The other drugs tested did not improve average survival in any dose or duration. The results of this study reveal glutamate holds promise for the development of novel therapeutics for epilepsy. This study can lead to a more effective way to slow down or halt the degeneration of the brain in patients by subduing the excitotoxicity in the brain caused by epilepsy.
Cost Effectiveness of Treatment Options for Extreme Short Bowel Syndrome: A Markov Analysis

Riya Verma
Horace Greeley High School, Chappaqua, NY  10514
Teacher: Dr. Trudy Gessler / Mentor: Kishore lyer, MBBS, FRCS (Eng), FACS, Mount Sinai School of Medicine and Mount Sinai Hospital, NY

Extreme Short Bowel Syndrome (ESBS) is an intestinal condition in which a patient has less than 50 cm of bowel remaining. The current standard of care for patients with ESBS is Parenteral Nutrition (PN), a method of delivering nutrients to the body intravenously. Two alternate treatment options are Intestinal Transplant (ITX) and Teduglutide, a glucagon-like peptide-2 analog that enhances the intestinal structure and function. The relative quality of life (QOL), life expectancy, and cost benefits of the three treatments are unclear. The goal of the present study is to do a direct comparison of the three treatments by using the mathematical principles of Markov modeling, a method of representing a situation in terms of states and probabilities of transition between the states. A Markov model was constructed representing the possible progression of ESBS using a 40 year-old male as the base case. Based on related published studies in existing literature, QOL and cost models were developed and probabilities were estimated for the Markov model. Monte Carlo simulations suggest that for the base case with ESBS, Teduglutide treatment appears have a higher QOL and life expectancy, though an initial placement on the ITX wait list may be the most cost effective.

Investigation of Apoptosis in ERBB2 +/- breast cancer cells

Anum Hussain
Shaker High School, Latham, NY  12110
Teacher: Mr. Nathaniel Covert / Mentor: Dr. Douglas Conklin, University at Albany Cancer Research Center

Overexpression of the adverse prognostic marker ERBB2 occurs in 30% of breast cancers and is associated with aggressive disease and poor outcomes. ERBB2 (also known as HER2) positive breast cancer has been a target of many breast cancer researchers, and experts can use this gene to predict the relapse time and survival of patients. It has been found that some oncogenic mutations disrupt apoptosis, which leads to tumor initiation, progression or metastasis. By treating the HER2 positive cell lines, BT474 and SKBR3, with the drug treatments Herceptin, GW9662, Lapatinib and combinations of the three, we are investigating the amount of Caspase-3 signaling. Based on previous experiments in the lab we hypothesize that there will be high Caspase-3 signaling in GW9662 (a PPARy antagonist originally developed as an anti-obesity drug, but which has been demonstrated to have an effect on HER2 positive breast cancer) and that it induces HER2/neu+ BT474 and SKBR3 cell apoptosis, and that GW9662 combination with other drugs gives a greater growth-inhibitory effect than either agent alone in the ERBB2 positive breast cancer cell lines. We found that when looking at the effect of the GW9662 therapy, the HER2+ breast cancer cell line was most affected by apoptosis. The additive effect of GW9662 and Lapatinib was neither proven nor disproven, and will be further studied.
Neuropeptide-Y Receptor Y₂ Antagonism Attenuates Inflammatory Bowel Disease-Like Pathology
Stephanie Becker
Ossining High School, Ossining, NY 10562
Teachers: Mr. Angelo Piccirillo and Ms. Valerie Holmes / Mentor: Dr. Susan Croll, Regeneron Pharmaceuticals

Pharmaceuticals designed to treat inflammatory bowel disease (IBD), an autoimmune disease characterized by a pro-inflammatory and anti-inflammatory cytokine imbalance and chronic histopathological changes in the gastrointestinal (GI) tract, are often inefficient and cause serious side effects, thus necessitating the development of more efficacious forms of treatment. It has been suggested that Neuropeptide-Y (NPY), a 36-amino acid peptide in the GI tract, may play a pivotal role in mediating IBD neuroinflammation by modulating key immune cell functions through its Y₁ and Y₂ receptors. Therefore, the current study blocked NPY receptor signaling through its Y₁ and Y₂ receptors in an experimental colitis murine model to determine if this blockade improved IBD-like histopathology and if these histopathological changes are correlated with behavioral and biochemical changes. ImageJ software measurements and blinded severity ratings assessed the histology of the colon, which included quantification of colonic architecture, cell counts, and inflammation. Data revealed that in experimental colitis, Y₁ antagonism significantly increased IBD-like pathological effects (p<0.05) and strengthened the correlations associated with IBD (p<0.05). In contrast to Y₁ antagonism, Y₂ antagonism significantly decreased IBD-like pathological effects (p<0.05) and reversed the correlations associated with IBD (p<0.05). Combined, these results identified Y₂ receptor antagonism as a novel therapeutic strategy for the treatment of IBD at a pathological and biochemical level, which may lead to a more specific and effective treatment for IBD.

The Unique and Disease Protective Mutation A2T changes the Dynamics of Amyloid β: A Solution NMR Study
Muhammad Ali
Shaker High School, Latham, NY 12110
Teacher: Mr. Nathaniel Covert / Mentor: Dr. Chunyu Wang, Rensselaer Polytechnic Institute

Amyloid β (Aβ) peptides play a significant role in the pathogenesis of Alzheimer’s disease (AD). Aβ40, composed of 40 residues, is the most common species of Aβ in the human brain. Interestingly, a unique mutation in the precursor protein of Aβ40 results in the production of Aβ40-A2T, which conversely inhibits various symptoms of dementia and leads to a disease protective phenotype.

To probe whether dynamics contribute to such different functional roles, solution nuclear magnetic resonance (NMR) experiments of Aβ40 and Aβ40-A2T were carried out. A novel and inexpensive Aβ purification protocol was developed to provide Aβ monomers for these experiments. NMR data suggests that the A2T mutation causes a significant increase in rigidity of the N-terminus. This increased rigidity may serve to decrease motion and inhibit the aggregation of Aβ40-A2T into lethal senile plaques that cause dementia. Subsequent NMR experiments seem to confirm such decreased aggregation rates for Aβ40-A2T.

Thus, a conformational feature has been identified that contributes to changes in toxic aggregation and leads to a distinctive disease protective phenotype. This information might prove significant for the development of a rational drug-based treatment seeking to emulate the properties of Aβ40-A2T.
**3:45 – 3:57 p.m.**

**Observing the Impact of Lypd6 Presence in the Development and Interaction of Parvalbumin and Somatostatin Inhibitory Neurons**
Christopher Gallego
Ossining High School, Ossining, NY  10562
Teachers: Mr. Angelo Piccirillo and Ms. Valerie Holmes / Mentor: Dr. Hirofumi Morishita, Mount Sinai School of Medicine

The functionality of the human brain and offset of mental condition relies heavily on the balance of inhibitory and excitatory interneurons. The protein Lypd6 is exclusively present in somatostatin interneurons, which interact directly with parvalbumin interneurons through synapses. The specific role of Lypd6 in parvalbumin and somatostatin interneuron development or synaptic connectivity remains unknown. This research investigated the role of Lypd6 in regulating parvalbumin and somatostatin development and synaptic connectivity in the visual cortex. Immunohistochemistry and image analysis were performed on the visual cortex of Lypd6 wild-type (WT), transgenic overexpression (Tg), and knockout (KO) mice models. Results revealed Lypd6KO significantly increased parvalbumin interneuron cell density (p<.01), while Lypd6Tg resulted in no change of parvalbumin interneuron cell density (p>.05). Somatostatin interneuron cell density was not affected in KO or Tg mice. Additionally, no changes in synaptic connectivity were found0 in KO mice. Lypd6Tg mice demonstrated significantly higher synaptic connections compared to WT mice (p<.01). The results indicate that Lypd6 influences synaptic connectivity and parvalbumin interneuron development. These findings may provide novel insight into the role of Lypd6 in brain connectivity and ultimately contribute to our understanding of the development of psychiatric and neurological disorders such as schizophrenia and epilepsy.

**General and Environmental Biology  CC 375**

**1:03 – 1:15 p.m.**

**Effects of an apterous Gene Mutation on Drosophila Circadian Activity Rhythms**
Danielle Bonser
Saratoga Springs High School, Saratoga Springs, NY  12866
Teacher: Ms. Evelyn Perkins / Mentor: Dr. Bernard Possidente, Skidmore College

The effect of the *apterous* gene on the circadian locomotor rhythms in *Drosophila* was investigated. Circadian activity rhythms of *apterous* flies were tested against the rhythms of wild-type and *vestigial* flies to prove that the abnormal rhythms observed in *apterous* flies were not due to the absence of wings. An F1 group of hybrid wild-type/*apterous* flies were observed, showing that the *apterous* gene mutation significantly impairs circadian locomotor rhythms in a genetically recessive manner. An F2 cross resulted in *apterous* flies with a new genetic background. Observation of the *apterous* F2 flies proved that the abnormal circadian phenotype observed in the *apterous* strain segregates with the *apterous* mutation regardless of the background genotype. This is the first demonstration of the effect of the *apterous* gene on circadian rhythms. Further studies are needed to determine if the *apterous* gene is a core clock gene or acts on peripheral clock pathways.
**1:30 – 1:42 p.m.**

Identification and Localization of Carbon Concentrating Mechanism Components in *Chlamydomonas reinhardtii*

Zoe Friedberg  
Nyack High School, Nyack, NY 10960  
Teacher: Mrs. MaryBeth Foisy & Mrs. Kirsten Kleinman / Mentors: Dr. Luke Mackinder, Jonikas Lab, Carnegie Institute of Science, Stanford University

Photosynthesis harnesses the sun’s energy to fix carbon dioxide and water into organic carbon. All of the food we eat and over 99% of all carbon fixed is by photosynthesis. Most crops including wheat, rice and soybeans are C3 carbon fixing plants, limiting their photosynthetic capabilities. This is partially due to the enzyme ribulose-1,5-bisphosphate carboxylase/oxygenase, RuBisCO, which wastes a lot of energy to photorespiration. Algae often experience fluctuations in inorganic carbon levels that alter the availability of materials to maintain sufficient RuBisCO function. To combat this problem, algae have evolved a Carbon Concentrating Mechanism (CCM), to elevate the internal concentration of CO2 in the vicinity of RuBisCO. *Chlamydomonas reinhardtii*, a versatile model organism, both autotrophic and heterotrophic in nature, operates an efficient CCM. However, there is little known about the precise roles and functions of most candidate components of the CCM. Through the creation of a high-throughput fluorescence-tagging pipeline in combination with protein localization technologies, this study helped to understand the functions and locations of candidate CCM genes.

**1:57 – 2:09 p.m.**

Investigating the Flight Orientation of Lab Raised Monarch Butterflies

Alexis A. Scott  
Burnt Hills – Ballston Lake High School, Burnt Hills, NY 12027  
Teacher: Mrs. Regina Reals / Mentor: Dr. Robert Olberg, Professor of Biological Sciences and Neurobiology at Union College

Every fall, the Monarch butterfly migrates to Central Mexico where they hibernate during the winter in North America. This historic migration is now threatened as the species undergoes a population decline. The species is struggling to survive for several reasons; 1) their food source, milkweed, is threatened by expanding agricultural development; 2) the habitat in their wintering sites has decreased; and 3) global climate change is affecting the timing of their migration. Efforts to reduce these factors might come too late if the butterfly population reaches a critical low. It might be necessary to conserve the North American Monarch by boosting populations with lab-raised individuals.

A flight simulator was constructed to investigate the flight-orientation of lab-raised Monarchs by allowing them to fly in any horizontal direction and enabling flight-orientation to be continuously recorded. Testing the flight-orientation of lab-raised Monarchs during the fall migration period provided evidence that lab-raised Monarchs will perform migratory behaviors comparable to wild Monarchs. This makes it possible for the migrating North American Monarch butterfly population to be revived by the release of lab-raised Monarchs.
Linkage Disequilibrium in the Chemokine CCL5 between Japanese and Nigerian populations
Amiti Banavar
Pelham Memorial High School, Pelham, NY, 10803
Teacher: Mr. Steven Beltecas / Mentor(s): Nevenka Dimitrova, Phillips Research, Gurinder Atwal, Cold Spring Harbor Laboratory

The evolution of the Human Genome as our ancestors migrated out of Africa and into the Eurasian landmass over 200,000 years can now be tracked using next generation sequencing and statistical analysis. Despite great advancement in understanding the original African diaspora, there has been little advancement in mapping this vast data in a clinically significant way. This paper attempts to map two populations, one with little recent selection (Nigerian) and a population with significantly more recent selection (Japanese) in terms of the chemokine CCL5, also known as RANTES, which plays a role in chemotaxis for Eosinophil granulocytes and T-cells. This chemokine is a gene promoting inflammatory responses in the bloodstream, and functions in creating an immune response through leukocytes against infectious diseases. CCL5 is shown to play a part in tumor cell survival, proliferation and invasion by a variety of mechanisms. In addition, it has been shown that variants on this gene could play a significant role in cancer predisposition. The receptor of the chemokine, CCR5, has been studied increasingly in recent years due to its role in HIV resistance; it has been found to contain a 32 base pair deletion (CCR5Δ32) that renders individuals immune to HIV. We found 3 SNPs that vary significantly between the two populations; these may explain differences in predisposition and also modulation of drug response between these two populations. While studies like this one are essential to generate new hypotheses in population genetics, it is critical to investigate further into the population differences with specific disease hypotheses in mind.

Spatial Habituation in the crayfish Procambarus clarkii
Jacqueline Ricca
John Jay High School, Cross River, NY 10518
Teacher: Ms. Ann Marie Lipinsky / Mentor: Dr. Frank Grasso, CUNY Brooklyn College

Invasive species are a threat to delicate freshwater ecosystems. The invasive red swamp crayfish, Procambarus clarkii, is native to the northwestern United States. With the expanding trade of commercial fishing industries in the 1960s, this species has spread all over the world and began to compete with native crayfish populations. Crayfish live along rivers, lakes, streams, and ponds while occupying a specialized niche, scavenging on plants and other arthropods while living in fairly complex underwater burrows. P. clarkii also transport the deadly crayfish plague, Aphanomyces astaci, a water mold. Prevention and eradication methods have not proven successful thus far. Greater knowledge of P. clarkii is crucial to eliminating their invasive presence.

Tactile information plays a significant role in environmental familiarization for crayfish. This study examined whether P. clarkii can indeed understand and remember aspects of its environment placing a heavy reliance on tactile sensors. Red swamp crayfish were placed in 3 arena conditions to examine spatial ability and memory by measuring total distance traveled. Previous research (Basil and Sandeman, 2000) found that dishabituation (exploratory activity) increased from the introduction of one configuration to the next. However, in this study, Procambarus clarkii showed no trend in dishabituation within conditions but an overall downward trend throughout all trials. Results showed that dishabituation only decreased when introduced to a new configuration. These results suggest spatial learning and memory duration is a species variation and perhaps it is these unique skills that make P. clarkii highly adaptable.
3:18 – 3:30 p.m.
The Development of an Oil Filter that Uses Biowaste as the Sorptive Media
Dalia Laredo
Somers High School, Lincolndale, NY 10540
Teacher: Mr. Greg Horrace / Mentor: Dr. Thamara Laredo, Lakehead University

This research aims to find a sustainable and reusable biowaste that can effectively filter oil in an oil-water based system. Examples of typical natural sorbents, also known as filters, are cotton, barley straw, rice husk, kapok fiber, wood residues, and hemp fiber; however this research investigates the prospect of Dorset Sheep wool. Unuseful for commercial purposes due to its high amount of waxes, this 3rd grade wool increases in value when used as a sorbent. As a sorbent, the wool has many ideal qualities: it is oleophillic, naturally waxy, and fibrous. The quality of being oleophillic allows the sorbent to attract oil yet repel water; thus, the sorbent's properties won't change while submerged in the water system. The waxes allow temporary forces of attraction between the sorbent and the oil, while the fibers' crimps, twists, and surface roughness create a macroporous structure that lends itself to the entrapment of oil. Unlike several past studies which test sorbents including wool in static systems, this experiment uses an oil spill simulator that creates a kinetic water system in order to accurately represent the standard oil spill conditions under which wool as a sorbent would have to operate. Since wool was able to sorb 7.4 times its weight in oil, wool is a very prospective sorbent for future commercial use.

3:45 – 3:57 p.m.
The Importance of Particle Association with Antibiotic Resistant Bacteria and Sewage Related Bacteria in an Aquatic Environment
Amanda Morel
Pelham Memorial High School, Pelham, NY
Teacher: Mr. Steven Beltecas / Mentor: Dr. Gregory O’Mullan, Queens College: CUNY

Particles pose a serious health hazard as they can harbor antibiotic resistant bacteria, sink to the underlying sediment, and, once disturbed, can contaminate the above water, leading to the spread of pathogens unnoticed and unchecked by water quality testing centers. Past studies have found a connection between the fecal indicator Enterococcus and antibiotic resistant bacteria. Enterococcus has also been found to be mainly particle-associated, thus it is hypothesized that antibiotic resistant bacteria would also be particle-associated. Four sites along Flushing Bay were sampled during both times of wet and dry weather conditions. Water samples were filtered to remove all free-living bacteria to observe the persistence of particle-associated bacteria. Enterococcus concentrations were measured using the Enterolert media, and plates, containing tetracycline, were spread to find the concentration of antibiotic resistant bacteria. Results showed that particles are often colonized with antibiotic resistant bacteria, and particles prolong the persistence of these microorganisms. In addition, under wet weather conditions there were increased signs of sewage contamination. This was the first study to observe the relationship between particles and antibiotic resistant bacteria. Thus, particles play a significant role in sewage contamination and should be heavily monitored by water quality testing centers.
**1:03 – 1:15 p.m.**

**Novel Zinc-Air Battery Current Collectors Using 3D-Printed Conductive Plastic**

Michael Doppelt  
Horace Greeley High School, Chappaqua, NY 10514  
Teacher: Dr. Trudy Gessler / Mentor: Dr. Michael Hickner, The Pennsylvania State University

The past decade has witnessed growing applications for additive manufacturing (AM), better known as 3D-printing, in the fabrication of electronics. Long used as a modeling technique, AM technology has become capable of generating functional and structurally integrated devices, including various zinc-based batteries. In the past, such batteries have depended upon precious metals, such as silver nanoparticles, for electrical conductivity, yet with rising metal costs, an alternative paradigm is desirable. This study evaluates conductive acrylonitrile butadiene styrene (ABS), a newly released thermoplastic with $10^{4}$ Q/cm of resistance, as a conductive material in zinc-air batteries. A novel prismatic battery design with conductive ABS current collectors was engineered using CAD software and printed on a MakerBot 2X Replicator. The battery was functional, demonstrating the viability of a battery with all-plastic hardware. Open circuit voltage was measured at 1.18 V, and the maximum current density was calculated to be $8.51 \text{ llA/cm}^2$, approximately three orders of magnitude below commercial values. The data corresponded well with conductive ABS's comparatively high resistance, leaving room for future improvement as plastics of higher conductivity emerge. It is hoped that the model developed herein will encourage further inquiry into the development of all-plastic, recyclable battery devices.

**1:30 – 1:42 p.m.**

**An alternative method of communication with Emergency Services during intruder-related situations:**  
A novel mobile application

Bessie Jiang  
Byram Hills High School, Armonk, NY 10504  
Teacher: Mr. David Keith / Mentor: Mr. Christopher Lewick, Byram Hills High School

Intruder-related emergencies have become more prevalent. Traditional methods to contact Emergency Services are too conspicuous or time-consuming to be feasible. The standard 911 voice call requires a visible, audible explanation, and location detection may be simply the location of the cell tower. I created and analyzed a specific mobile application, which sends a text with the GPS coordinates of the phone to a number, when the phone is shaken vigorously. In Part One of the experiment, subjects watched ten video clips of students either pretending to dial 911 or shaking their phone. The goal was to compare the level of discretion with which users were able to use the application. In Part Two of the experiment, subjects were filmed for timing purposes as they dialed a three-digit number and used the application I created. The objective was to determine the speed users were able to send a text message through the application compared to making a phone call. On average, subjects in Part 1 accurately identified students pretending to dial 911 26.8% more often than students shaking their phone (p<.0001). Participants in Part 2 took an average of 3.22 seconds more to dial 911 than to utilize the application (p<.0001).
PVA/PNIPAm Hydrogels with Enhanced Thermoresponsive Properties
Michael Huang
Shaker High School, Latham, NY
Teacher: Mr. Nathaniel Covert /Mentors: Dr. Joost Vlassak and Dr. Zhigang Suo, Harvard University, Cambridge, MA

The thermoresponsive hydrogel, Poly(N-isopropylacrylamide) (PNIPAm), is used as a smart and intelligent polymeric material with various potential applications, including soft robotics, intelligent agriculture, smart window glazings, artificial muscles, microfluidic valves and drug delivery. The response rate, stiffness and toughness are key properties that need be improved. We synthesized a double network Poly(Vinyl alcohol) (PVA)/PNIPAm hydrogel by crystallizing various concentrations of PVA in a PNIPAm network, through the process of dry annealing in a vacuum. Experimental results show that the newly developed hydrogel with a PVA to PNIPAm ratio of 1:4 can diffuse out over 70% of its water in 5 minutes, and has a blocking stress of over 180 kPa, which are both about one order of magnitude higher than the same properties of regular pure PNIPAm or PVA hydrogels. A hypothetical mechanism is proposed to understand the phenomenon. The newly developed quickly responding and stiff PVA/PNIPAm hybrid hydrogel is promising to be used in making soft robotics, microfluidics and smart glasses.

Solving the Energy Crisis One Step at a Time
Swarnav Pujari
Yorktown High School, Yorktown Heights, NY 10598
Teacher: Mr. Michael Blueglass / Mentors: Wenzhuo Wu, and John Gollisz, Georgia Tech and Yorktown High School

Finding a new sustainable, powerful, reliable and environmentally friendly form of energy has been a problem that has grown in importance over the last few decades due to the energy crisis. In this quest for renewable energy, scientists fabricated a new type of energy harvesting device, a nanogenerator, that are self-powered and strong enough to power microelectronics using mechanical energy. This research focused on building a device, the Power Pad, in order to improve the output of these nanogenerators in order to power common household devices as opposed to microelectronics. In order to fabricate such a device two different set ups were required, a Hybridized Power Pad and a Unit Scale Power Pad. The Hybridized Power Pad was tested in a lab environment in order to see if the nanogenerators had potential real world applications. The Unit Scale Power Pad was tested in a school for 10 days in order to derive if the device was durable enough for heavy traffic and if it could generate enough power per square foot to power household devices. The outputs recorded from both stages were ~.45W and ~1kWh daily, respectively. This demonstrated that there are many real world applications for the Power Pad.
**2:51 – 3:03 p.m.**


Ariel Kanevsky  
Ossining High School, Ossining, NY  10562  
Teacher: Mr. Angelo Piccirillo and Ms. Valerie Holmes / Mentor: Dr. Tara Sainath, Google NYC

This research examined the unreliable detection of vascular complications following a type of microsurgery known as a free tissue transfer, and created a novel self-monitoring system capable of analyzing a free tissue transfer and detecting abnormal vascular flow within the vessel. Presently, a manual ultrasound is used to identify abnormal vascular flow in free tissue transfers; however, over one-half of abnormal flow instances are identified at late stages, leading to unsafe secondary surgeries. Our method is able to consistently identify failing tissue transfers at early stages, lowering mortality rates of microsurgery patients. Based on principles in speech recognition segmentation, this study explored a novel machine learning technique to automatically classify vascular flow as normal or abnormal. Specifically, we researched the use of a Neural Network/Hidden Markov hybrid for abnormal flow detection. Ninety minutes of vascular audio data was collected from 37 patients with free-tissue transfers in the forearm region. Our model is trained on the audio data and evaluated on a held-out test set (data not used in training the model). Our algorithm has a 94.7% detection rate (with 3.2% false alarm rate) despite varying quality of vascular flow audio, which shows potential for significantly improving methods of vascular flow monitoring. The implications of a constant monitoring system are a decreased reliance on manual methods of abnormal flow recognition, as well as an increase in early detection rates, therefore preventing fatalities due to secondary surgeries.

**3:18 – 3:30 p.m.**

**The Immobilization of Phosphorus-Based Flame Retardants using Halloysite Nanotubes**

Christin Abraham  
Pelham Memorial High School, Pelham, NY, 10803  
Teacher: Mr. Steven Beltecas / Mentor: Seongchan Pack, Ph.D., R&D at ICL-IP

Flame retardants (FRs) are widely used in industrial and household products. Toxic additive flame retardants can be released into the environment and have been linked to thyroid cancer and other disorders. My previous study found an environmentally friendly method for preventing the release of flame retardants into the environment by using halloysite nanotubes (HNTs). This former study has very wide applications, as HNTs loaded with flame retardants can be used in huge variety of polymers and products as a safe flame retardant alternative. Therefore, I tried to test a practical application of the HNTs immobilized with FRs by applying them to rigid polyurethane (PU) foam and a thermoplastic elastomer-polybutylene terephthalate (TPE/PBT) plastic composite. I examined the thermal and morphological properties of the PU foam and the TPE/PBT nanocomposite, as well as the tensile differences in the composite and the physical alterations of the foam. The results show a significant improvement in the thermal and morphological properties. Tensile strength substantially increased with the addition of the HNT-FR formulation. The physical structures of the PU forms became structured because the HNTs tended to agglomerate around the foam cells. The addition of the HNT-FR complex into the polymers have improved its properties.
3:45 – 3:57 p.m.

Using a Double Droplet System to Create a Fast-Scanning Microscope
John Dean
Scotia-Glenville High School, Scotia NY, 12302
Teacher: Mr. Chris Judd / Mentor: Dr. Amir H. Hirsa, Rensselaer Polytechnic Institute

The Double Droplet System (DDS) provides a unique type of adaptive lens, one that rapidly oscillates to scan a large range of focal lengths faster than other lenses can. In this project, a DDS of silicone oil in water was introduced to a camera microscope system to measure how an oscillating DDS changes the focal distance of the system. A DDS lens tank was built to replace the TV tube of a Zoom70XL microscope. An oscillating chamber utilizing magnetic coils driven by a microcontroller was built and used to actuate the lens and allow it to regularly oscillate. New methods to form large scale DDS’s (up to 0.75” diameter) were developed and implemented. Videos from the microscope of an angled target and videos of the DDS profile were analyzed to calculate the change in focal distance (1.15mm) and compare it to the change in focal length of the DDS. The resolution of the microscope with the DDS was determined to be 2.2-4.4μm. Microscopic particles and moving one-celled organisms were tracked in three dimensions using the scanning focus of the microscope. This type of lens could be used to replace vertically scanning piezoelectric microscope stages and allow for three dimensional tracking of microscopic objects in a stationary system with only one camera.

4:12 – 4:24 p.m.

A Search for Tidally-Distorted White Dwarf Binaries in the Kepler Survey
Charles Gulian
Ossining High School, Ossining, NY 10562
Teacher: Mr. Angelo Piccirillo and Ms. Valerie Holmes / Mentor: Dr. Michael Lam, Cornell University

White dwarf (WD) binary stars represent the final stage of stellar evolution for the majority of stars in our Galaxy, yet they are rare in the present age of the Universe. Only ~100 WD binaries have been discovered, severely limiting opportunities for observational studies of WD binaries that may further our understanding of transient astronomical events such as Type Ia supernovae. We therefore conducted an independent search for undiscovered WD binaries using publicly-available photometric data from the Kepler survey. A novel computational search method was created to identify potential binaries by detecting unique photometric signals that arise from tidal-interactions in binary systems. A sample of 1,970 stars in the Kepler field was selected based on the closeness of the stars’ color properties to those of known WDs. We downloaded all available photometric data for the sample from the Kepler archive, and analyzed the noise and variability characteristics of the obtained light curves. By visually inspecting all 399 light curves, we identified short-period variability in 156 stars in the sample. We used our computational search method to analyze these stars’ light curves, and thereby identified a single potential WD binary (KIC 11287855) that had not been previously discussed in the literature. This result has not yet been confirmed. The results of our computational search have implications for models of the local WD binary population and Type Ia supernovae research: because the Kepler survey observed stars in a well-defined field-of-view, our results can provide one of the first direct measurements of WD binary space density.
**Poster Sessions**
*(4:35 – 6:00 p.m.)*

All Posters are located in Performing Arts Center, Lab Theatre

**Session 1:**

1. **Retrotransposons: Understanding Their Role in Cell Growth and Longevity**  
Changgyu (Derek) Cho  
Shaker High School, Latham, NY 12110  
Teacher: Mr. Nathaniel Covert / Mentor: Dr. Patrick Maxwell, Rensselaer Polytechnic Institute

2. **Aqii-S®20E: Optimizing Dosage and Analyzing Behavioral Responses for a Possible Zero-Withdrawal Sedative in the Marine Species Common Snook (Centropomus undecimalis), Spotted Seatrout (Cynoscion nebulosus), and Red Drum (Sciaenops ocellatus)**  
Alison Bidjarano  
Byram Hills High School, Armonk, NY 10504  
Teacher: Mrs. Stephanie Greenwald / Mentor: Dr. Roy Yanong of the University of Florida

3. **Wnt Pathway Components’ Role in Human Cancer Cell Migration**  
Rebecca Mancusi  
The Ursuline School, New Rochelle, NY 10804  
Teacher: Ms. Palma Volino / Mentor: Dr. Marisa Carbonaro, Regeneron Pharmaceuticals, Inc.

4. **Investigating Patterns of Sleep, Multidimensional Life Satisfaction, and Nighttime Technology Use in Early Adolescents**  
Adam Krupinski  
Ossining High School, Ossining, NY 10562  
Teacher: Mr. Angelo Piccirillo and Ms. Valerie Holmes / Mentor: Dr. Christina Calamaro, Nemours/A.I. DuPont Children’s Hospital, Wilmington, DE

5. **The Effect of Antibiotics on a Drosophila melanogaster Model of Autism**  
Kathleen Harwood  
Mamaroneck High School, Mamaroneck, NY 10543  
Teacher: Mr. Guido Garbarino / Mentor: Dr. Tadmiri Venkatesh, City College of New York

6. **Determining the Most Effective Pheromone and Essential Oil for the Management of the Highly Invasive Brown Marmorated Stink Bug**  
Tess Tobin  
John Jay High School, Cross River, NY 10518  
Teacher: Ms. Ann Marie Lipinsky / Mentor: Dr. George Hamilton, Rutgers University

7. **Using Neural Networks and Genetic Algorithms to Predict Foreign Exchange Rates**  
Colin Atkinson  
Sleepy Hollow High School, Sleepy Hollow, NY 10591  
Teacher: Mrs. Janet Longo-Abinanti / Mentor: Mr. Andrew McDonald, University College London

8. **Developing an Accurate, Easy-to-Use Speech Interface for Human-Robot Interaction**  
Adarsh Subramani  
Yorktown High School, Yorktown Heights, NY 10598  
Teacher: Mr. Michael Blueglass / Mentor: Dr. Jonathan Connell, IBM Watson Research Center
Session 2:
9. The Effect of Three Different Drumming Grips on Tendon and Muscle Fatigue in the Wrists and Hands of High School Non-Drummers
Casey Kenny
Valley Central High School, Montgomery, NY 12549
Teacher: Mr. Henry Pizzonia / Mentor and affiliation: Dr. Daniel Fishman, Peak Physical Therapy

10. The Enhancement of the Emotional Memory System Using Epinephrine, and its Applications to Alzheimer's Disease
Lauren Latham
John Jay High School, Cross River, NY 10518
Teacher: Ms. Ann Marie Lipinsky /Mentor: Dr. Andrew Teich, Taub Institute at Columbia Medical Center

11. Antioxidant Potency in Apples during Long Term Storage
Misa Hussien
Germantown Central School, Germantown, NY 12526
Teacher: Mr. Dale Strong / Mentor: Monica Carlsen, University of Oslo

12. A Functional Analysis of the Sodium/Multivitamin Transporter
Rizza Estacio
White Plains High School, White Plains, NY 10605
Teacher: Ms. Kimberly Fleming / Mentor: Dr. Matthias Quick, Columbia University Medical Center

13. Examining the Development of Multisensory Integration in Speech Processing Through the McGurk Illusion
Brinda Ramesh
Ossining High School, Ossining, NY 10562
Teacher: Mr. Angelo Piccirillo and Ms. Valerie Holmes / Mentor: Dr. Hans-Peter Frey, Albert Einstein College of Medicine

14. Effects of Grazing Native Perennial Grasses in California Grasslands on Methanogenesis by Bos Taurus
Beckett Morris
Dobbs Ferry High School, Dobbs Ferry, NY 10522
Teacher: Dr. Tom Callahan / Mentors: Dr. Emilio Laca, University of California, and Mrs. Aubrianne Zamora, University of California, Davis

15. Evaluation of pKa values of Macrocycle-5 and its interaction with Tartaric Acid
Jules Picuri
Rondout Valley High School, Accord, NY 12404
Teacher: Ms. Elissa Jury / Mentor: Frantz Folmer-Andersen, PhD, SUNY New Paltz

16. An Investigation of Thermal and Electrical Energy Extraction from Solar Collectors
Ted Kaminski
Rondout Valley High School, Accord, NY 12404
Teachers: Mr. Lawrence Sicheri and Ms. Elissa Jury / Mentor(s): Steven Gruspier, and Dr. Wallace Leigh, Alfred University
Session 3:

17. Eat Your Vegetables: Isothiocyanate Inhibition of Usp22
David Gordon
John Jay High School, Cross River, NY 10518
Teacher: Ms. Ann Marie Lipinsky / Mentor: Dr. Lizbeth Hedstrom

18. Glioblastoma and Immunology
Caroline Aronin
Mamaroneck High School, Mamaroneck, NY 10543
Teacher: Mr. Guido Garbarino / Mentor: Jennifer S. Sims, Ph.D. Columbia University

19. The Phylogenetic Relationships of Homo floresiensis
Skylar Luu
Shaker High School, Latham, NY 12110
Teacher: Mr. Nathaniel Covert / Mentor: Dr. David Strait, University at Albany

20. Genome-Wide Association Study Identifies a Variant Associated with Histologic Factors of Nonalcoholic Fatty Liver Disease in Pediatric Patients
Danielle Morea
Somers High School, Lincolndale, NY 10540
Teacher: Mr. Gregory Horrace / Mentor: Dr. Joel Lavine, Columbia Medical Center

21. Predicting performance of de novo designed antimicrobial peptides
Gwenda Law
Burnt Hills-Ballston Lake High School, Burnt Hills, NY 12027
Teacher: Mrs. Regina Reals / Mentor: Dr. Georges Belfort, Rensselaer Polytechnic Institute

Herc De Guzman
Ossining High School, Ossining, NY 10562
Teacher: Mr. Angelo Piccirillo and Ms. Valerie Holmes / Mentor: Dr. Ioana Voiculescu, The City College of New York

23. Microfluidics-Facilitated Synthesis and Characterization of Apoptosis- Inducing Low-Cost Nanoparticles for Cancer Therapeutics
Jazz Munitz
Hendrick Hudson High School, Montrose, NY 10548
Teacher: Dr. Christine Rogers / Mentor: Dr. Willem JM Mulder, Mt Sinai School of Medicine

24. Analyzing Cross Generational Use of Facebook
Elana Kaplan
John Jay High School, Cross River, NY 10518
Teacher: Ms. Jodi Riordan / Mentor: Shawn Bergman, Ph.D., Appalachian State University
Session 4:

25. Reducing Duration of Magnetic Resonance Imaging Scans While Maintaining Perceived Image Quality
Nicole Zinger
Mamaroneck High School, Mamaroneck, NY 10543
Teacher: Mr. Guido Garbarino / Mentor: Dr. Roman Fleycher, Albert Einstein College of Medicine

26. Human skin equivalents: A novel approach to testing the pathogenesis of scleroderma tested by quantitative polymerase chain reaction and immunohistochemical staining
Ella Taubenfeld
Byram Hills High School, Armonk, NY 10504
Teacher: Mrs. Stephanie Greenwald / Mentor: Dr. Jonathan Garlick, Tufts University

27. Using Python Computer Programming Language to Explore Astrophysical and Cosmological Evidence of Dark Matter
Gabriel Natale
Dobbs Ferry High School, Dobbs Ferry, NY 10522
Teacher: Dr. Thomas Callahan / Mentor: Mr. Hugo Contreras, Columbia University Nevis Laboratories

28. Huntington’s Disease Affected Behavior of Transgenic Male Zebra Finches (Taeniopygia Guttata) in Various Social Environments is Altered by n-acetylcysteine Treatment
Hannah Consiglio
Suffern High School, Suffern, NY 10901
Teacher: Mr. Wendell Hala / Mentor: Dr. Wan-Chun Liu, The Rockefeller University

29. The Role of Macrophages in Metastatic Dissemination and Growth
Ethan Tardio
Irvington High School, Irvington, NY 10533
Teacher: Ms. Nadia M. Parikka / Mentor: Dr. H. William Birns, Indiana University of Pennsylvania (retired)

30. Dialect Acquisition in Downstate Migrants to the Catskills: A Study in Speech and Conflict
Julian Rauter
Margaretville Central School, Margaretville, NY 12455
Teacher: Mr. Jeffrey Mann / Mentor: Dr. H. William Birns, Indiana University of Pennsylvania (retired)

31. Identification of New Imaging Targets For N-Type Calcium Channel Blockers
Jeffrey Steckler
John Jay High School, Cross River, NY 10518
Teacher: Ms. Ann Marie Lipinsky / Mentor: Mirkka P. Sarparanta, Ph.D., Memorial Sloan Kettering Cancer Center

32. Growth of Cyanobacteria on Extraterrestrial Materials
Tyler Jenss
Nyack High School, Nyack, NY 10960
Teachers: Ms. Kirsten Kleinman and Ms. Mary Beth Foisy / Mentors: Dr. Michael Mautner, Virginia Commonwealth University, and Dr. Kristopher M. Baker, SUNY Rockland
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10. Gloversville High School
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We wish to extend a special thanks to our volunteers for contributing their time and talents to make the Upstate New York Junior Science and Humanities Symposium the best experience it can be!

Sub-regional Directors: The students who are presenting their original research at the Upstate NY JSHS are finalists from two sub-regional events that are held during January and February in New York State. The sub-regional directors who make these symposia possible are:

**Eastern JSHS**

- Regina Reals
- Burnt Hills-Ballston Lake High School

**Westchester and Rockland Counties JSHS**

- Ann Marie Lipinski
- John Jay High School

Additional Symposium Assistance: Special thanks to all the students and teachers who have volunteered to help. The Symposium wouldn’t be able to run smoothly without everyone’s generous help and consideration. Thank you to all the judges and moderators and to everyone else who helped with registration and AV equipment.
University in the High School Program

The University in the High School Program at the University at Albany was established in 1983 within the former College of Humanities & Fine Arts, now part of the College of Arts & Sciences. The UHS Program was originally designed as an innovative way to provide students in Capital Region high schools with the opportunity to earn University at Albany credit for advanced study in the foreign languages. The Program has since expanded to include course offerings from 23 academic departments, in addition to several schools and programs.

UHS Program courses provide students with the academic challenges of college-level curricula during their final year(s) of high school. As a "bridging" experience to college, UHS courses can help students begin to develop the skills and experience necessary for academic success in higher education. Enrollment in UHS courses may provide future opportunities to students, such as the ability to enroll in higher-level college courses or to complete a four-year degree in a shorter amount of time.