

# Minnesota Academy of Science Newsletter



## MINNESOTA ACADEMY OF SCIENCE

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## Message from the Executive Director

By Celia Waldock, Executive Director

We are so excited about the achievements of all of our students this year. We know the hard work that students participating in the State Science & Engineering Fair and Junior Science & Humanities Symposium put into their research projects. Thousands of students logged hundreds of hours in 2013-2014 outside of school to learn the scientific method and conduct research to address real-world problems, compete at regional science fairs and have a chance to move on to our State level of competition. Our standards are high. These achievements do not come without hard work and persistence or the support of parents and teachers such as our 2014 Seagate Mentor Award Winners Kevin Molohon, Champlin Park High School and Princessa Van Buren-Hansen, Intermediate District 287.

Here's what students have to say:

*Participating in the fair was probably one of the best experiences of my high school career. I really enjoyed being able to present my hard work from the summer in an environment where it was greatly appreciated and valued. I have only attended one science fair before, so I was very happy that the Minnesota State Science & Engineering was such a great experience. I also enjoyed being able to meet other high school students from around the state with such innovative projects, who share the same interest in science as I do.*

*I also enjoyed my encounters with the judges. They were all very interested in my research and took quality time to discuss it with me and give me great suggestions. Some of them asked me challenging questions, but this was good because it required me to expand my thinking and stay open to new ideas in my field. I really enjoyed being able to express and explain my research to these judges.*

—Elisa B. Villafaña

8700 West 36th Street • Suite 114W • St. Louis Park, MN 55426  
Phone: 952-545-6789 • Fax: 952-545-6336  
contact@mnmas.org • www.mnmas.org



## 2014 Spring Programs Report (Cont.)



Elisa Villafaña prepares for her JSHS presentation

Photo by Dave Newell

*I had a wonderful time at the Minnesota State Science & Engineering Fair. It was one of the few science fairs at which I have presented. The feedback that I received from all of the judges was amazing and made me think of my project in a new light. The atmosphere at the science fair itself was invigorating, just being surrounded by students who have worked so hard to have a successful project, in itself, was so inspirational. I had a strong feeling of kinship with the other students as I presented at the fair because we supported each other after we had finished presenting to each judge. Furthermore, the poster presentation ended up being a great opportunity to get suggestions on my project as well as a time to bond and learn from my fellow scientists.*

—Tiffany Ravelomanantsoa

*The State Science & Engineering Fair is an incredible opportunity for students all around the state. For me, the fair meant an opportunity to share my research with more judges and people. The questions I received from my judges were thorough and thought provoking. I was forced to think about my project in a new light. I was also*

*able to make connections with the students around me whose projects impressed and amazed me in their depth and creativity. It is amazing to see the work of so many bright young students.*

*I especially enjoyed talking to the public about my research and seeing their comprehension of and excitement about my project. In particular, I was able to speak to a young fifth grade boy and see his eagerness to learn about science, including my research. Presenting at the MAS State Science & Engineering Fair was a great culmination of my project. Without your hard work, this would not have been possible!*

—Claire Bingham

The hard work of students presenting at the regional and state level of science such as Connor Klemenhausen (2013), Tim Renier, Carolyn Jons, Alanna Bram, Kevin Zheng, Matthew Lerdahl, Jonah Butler, Michelle Campeau, Priyanka Narayan, Christine Neumann, Crystal Moynan and Jason Sylvestre (to name but a few) has earned them recognition, college scholarships, the chance to compete (and WIN!) at national and international science competitions and for Connor, a trip to the White House!

Students also competed by submitting their research papers to our High School STEM Communicator Awards, the winners of which have been invited to publish in the Academy's new online *Journal of Student Research* which is currently getting the last editorial touches put on and will be posted soon.

Once again, Science Bowl teams have amazed us with their vast STEM knowledge and ability to calculate complicated mathematical formulas in mere seconds going head-to-head in fast-paced question and answer rounds that leave the heads of those of us in the audience spinning! What a great opportunity it is for our winning high school and middle school teams to go on to compete at the

## 2014 Spring Programs Report (Cont.)

National Science Bowl, participate in the car races, meet students from across the country and vie for the championship in front of such illustrious leaders as Michelle Obama.

Here's what one student has to say:

*Science Bowl has been a very important extracurricular activity that has motivated me to learn more about science. Since my participation in Science Bowl in 9th grade, I've developed as a person and met new people. Science Bowl has encouraged me to study more than one subject; it has made me a well-rounded person in the scientific field, while also stimulating me to specialize in specific topics that I have interest in. During the past years, I looked forward to our team's Science Bowl practices because they were fun and informative. As one of the team's captains, my leadership skills have developed while practicing with the team. Due to my participation in Science Bowl, I've become more comfortable communicating with others and have succeeded in increasing my capacity of scientific information.*

*Teamwork is crucial in Science Bowl. Although one person can win by him/herself, it's very difficult to do so, and is inefficient. The team must work together in order to effectively allocate its skills to each of the subjects in Science Bowl. A person who's interested in a subject, like Biology, should specialize in that subject, while knowing information pertaining to the other subjects as well. Besides being effective, teamwork makes Science Bowl more enjoyable.*

—Michael Tsuei

It is incredibly rewarding to be providing programming that truly excites student interest and offers a pathway to lifelong learning and pursuit of science, technology, engineering and math careers!



Senator Melissa Wiklund and Executive Director Celia Waldock talk to Ezra Grothe and Richard Sather from Thief River Falls

Photo by Dave Newell

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## Message from the President

By Mike Williams, President of the Board of Directors

The Presidency of the Minnesota Academy of Science is a position with a long and proud history of renowned scientists. As the current President of the Academy, I am honored to be listed among the likes of Dr. Henry F. Nachtrieb, first State Zoologist, Dr. Newton H. Winchell, first director of the Minnesota Geological Survey, Dr. Lawrence M. Gould, president of Carleton College, Dr. Charles Sheard, award-winning optometrist at the Mayo Clinic, and Dr. Asa E. Johnson, the Father of the Academy.



*Mike Williams at  
Science Salon*

*Photo by  
Dave Newell*

When he was elected as the first President in 1873, Dr. Johnson's ideals of scientific knowledge, energy, and enthusiasm for the study of nature became the founding spirit of the Academy. Dr. Johnson was a pioneering physician in St. Anthony and also published 18 scientific papers on the mycology of Minnesota. "As a trustee and business man, he gave generously of his time and means," wrote Secretary Harlow Gale, noting that his modesty was "only equaled by his fidelity to every detail of the Academy's life, both great and small." Upon his death in 1906, Gale wrote that Dr. Johnson's love of nature and quest for scientific knowledge would "continue to be the motive spirit" of the Academy and would "be transmitted as a growing heritage to the perpetual intellectual life of our beloved State."

The office of the Presidency continues to shape the direction of the Academy 142 years after Dr. Johnson's inaugural address. I strive to transmit Dr. Johnson's energy and enthusiasm for scientific inquiry by giving my time and support to the Academy. I volunteer for our educational programs that encourage students to engage with scientific research; I attend lectures by professional scientists throughout the state; and I am a supporting member of the Minnesota Academy of Science.

As the Board of Directors considers changes to our strategic plan and vision for the future of the Academy, we continue to emphasize Dr. Johnson's founding ideals of enthusiasm for the sciences, scientific inquiry, and service to the scientific community.

# In Photos: Dr. Jason Simser Lecture

Photos by Dave Newell



Board Secretary Karen Newell greets attendees as they arrive



Dr. Kathryn Hanna asks Dr. Simser questions



Lifetime Member Wayne Wolsey and Board Secretary Karen Newell network with attendees



Guests enjoyed conversation while waiting for Dr. Simser's talk



The Open Book was filled with attendees to hear Dr. Jason Simser's talk on forensic science at the BCA

# Recap: Science Salon - Stay current, Stay connected

By Barbara Donoho, Science Salon Coordinator

Science Salon, a program of MAS, completed the first program year by successfully implementing two additional Science Salons this spring. Science Salon is a forum for professional scientists to stay current on groundbreaking research and emerging technologies and engage in cross-disciplinary networking.

The March 5, 2014 Science Salon, held at the Open Book, featured Dr. Jason Simser, a Forensic Scientist with the Minnesota Bureau of Criminal Apprehension (BCA). Dr. Simser, a Lead Casework Forensic Scientist in the Biology Section of the BCA, is also a trained member of the Crime Scene Response Team. Dr. Simser talked about the biology section of the BCA, evidence exams and different forms of DNA testing and presented an overview of the BCA, investigations, criminal histories and law enforcement support.

The evening included networking, door prizes and a free beverage for individuals returning a completed survey. A cash bar was also available.

At the Science Salon, interested attendees signed up for a BCA tour that was conducted during business hours one week later. This was an exceptionally interesting and informative tour of the BCA in St. Paul.

The fourth Science Salon, held May 15, 2014, was sponsored and hosted by 3M at the



*Barbara Donoho greets Science Salon guests at the 3M Innovation Center Photo by Dave Newell*

3M Innovation Center at the company's global headquarters in Maplewood and included a tour of the World of 3M Innovation. This tour is not typically open for the public, so it was very special that we were able to have our Science Salon at the 3M Innovation Center.

The World of 3M Innovation display houses 3M's diverse products and processes, technologies and discoveries in an interactive setting with hands-on demonstrations. Guests are able to see the technologies and the practical real life applications. The interactive lights and sounds among the displays are amazing. We had three experienced 3M tour guides, who made the tour even more interesting.

A reception, sponsored by 3M, gave the attendees an opportunity to mingle and

discuss the 3M tour while enjoying a variety of hors d'oeuvres and drinks.

After the reception, Matt Scholz, 3M Corporate Scientist in the Infection Prevention Division Laboratory, talked about the innovation culture of 3M. Matt is a co-inventor on over 130 issued US patents and is a member of the 3M Carlton Society. He has been with 3M Healthcare for 32 years and his work presently focuses on saving lives by preventing healthcare-associated infections.

This Science Salon was the highlighting event of the first program year and was well received, with 67 attendees having the opportunity to experience the spirit of 3M Innovation.

# In Photos: The World of 3M Innovation

Photos by Dave Newell



*Dr. Michael Kautzky and Dr. Michael Williams*



*Dr. Ihsuan Li and other attendees listen to Dr. Felicia DeSantos*



*Attendees networked in the lobby of the 3M Innovation Center prior to touring the World of 3M Innovation*



*Attendees were treated to food and drink during the networking portion of the event*



*3M Host Chantal Courteau and Speaker Matt Scholz, Corporate Scientist*

# Doubling the Rewards: Volunteering My Time and the 3M Volunteer Match Program

By Caroline Ylitalo, 3M

When I saw the 3M Foundation e-mail inquiring which non-profit should receive the grant for my volunteer hours, I reflected upon the past year and my involvement with the Minnesota Academy of Science (MAS) across multiple programs.

I fondly recalled the fun day my son and his friends experienced during the Science Bowl State Tournament (administered by MAS). The students enjoyed interacting and competing with science-centric students from other schools, admired their cool event T-shirts, and ended the day with a second place finish. This was my fourth year coaching the Science Bowl, my fourth year teaching tutorials to the students, and my fourth year driving my teams to Macalester College through a bitterly cold Friday afternoon in January for the State Tournament.

I also reflected on my involvement over the past eight years with the State Science & Engineering Fair (another flagship program of MAS). Through volunteering as a judge at the Fair, I learned that science projects enrich and supplement traditional science curriculum offered in the schools, which led me to encourage my two sons along with scores of their friends to work on a project each year. Advancing to the State Science & Engineering Fair was their reward for a project well done,



*Caroline (right) with one of her teams from the 2013 Minnesota State Regional High School Science Bowl*

*Photo provided by Caroline Ylitalo*

and many would already be asking me to help with project ideas for next year.

Most recently I have been volunteering to help the 3M visiting wizards with their presentation at the State Science & Engineering Fair since I no longer qualify for judging with one or both of my sons in the competition. This activity put me in a position to observe students light up with excitement as they watched the show.

Volunteering with multiple MAS programs gave me the opportunity to positively impact and mentor many students, and as a result the 3M Foundation donated \$250 to MAS. Although a modest

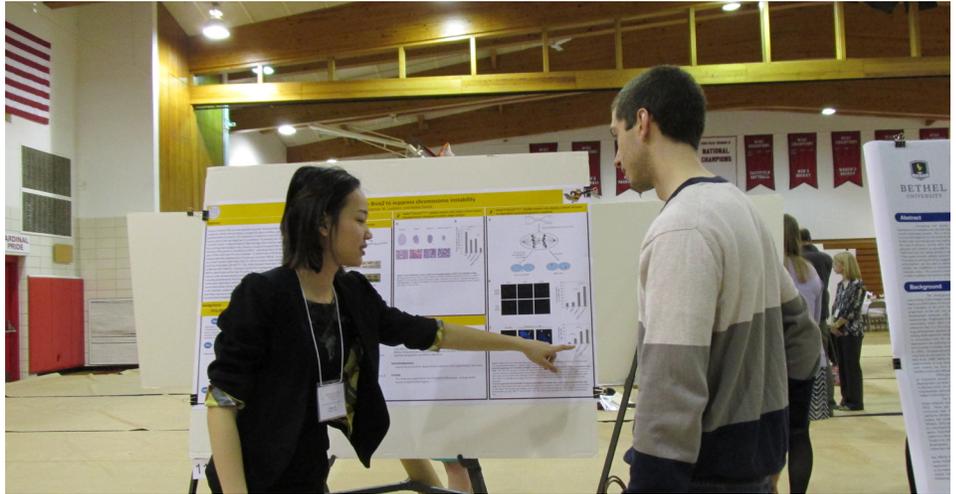
amount, this contribution along with other donations will ensure that MAS will continue to offer quality science programs to our students and to the community.

# Recap: 2014 Annual Meeting & Winchell Undergraduate Research Symposium

By Eliza Grames, Annual Meeting Coordinator

The 2014 Annual Meeting & Winchell Undergraduate Research Symposium was held at St. Mary's University of Minnesota in Winona, MN. 132 students from Minnesota, Wisconsin, and Iowa presented their undergraduate research to professional scientists and academic researchers.

2014 was a record year for the Symposium. Students presented research in 10 of 11 categories, including the first-ever presentations in Math & Computer Science and Engineering. The number of students presenting research in Economics, Physics, and Social Sciences increased significantly. We had more colleges (24 total) participating than ever before, including our first Iowa and first Wisconsin schools. We were pleased to welcome five new institutions: Century College, Crown College, Des Moines Area Community College, Viterbo University, and Winona State University.



*Naomi Do from the University of Minnesota explains her research to another student*

*Photo by Eliza Grames*

The keynote speaker was Kevin Kenow, Research Wildlife Biologist with the Upper Midwest Environmental Sciences Center. Kenow gave a presentation about his research on common loon conservation and habitat preservation along the Upper Mississippi River. In addition to the keynote speaker, students participated in breakout sessions with topics ranged from the new MCAT format to bluff ecology of the Mississippi River.

Dr. Deb Martin chaired the Planning Committee. Members put in hundreds of volunteer hours to ensure that space was secured, judges were recruited, space was set up, and everything was provided for students to present their research.

## Thank you to our sponsors

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University of Minnesota - Twin Cities, Graduate School

Winona State University

# Student Perspective: Presenting at Winchell Undergraduate Research Symposium

By Nicole Benhart, Des Moines Area Community College



*Nicole Benhart presents her research*      *Photo provided by Nicole Benhart*

My name is Nicole, a Des Moines Area Community College (DMACC) student from Des Moines, Iowa, and I presented my research this year at the Winchell Undergraduate Research Symposium. I wanted to take the time to tell you about my experience at the Symposium and a little bit of background about myself, as well as my future plans.

First, I would like to start out talking about my background. I am a respiratory therapy student at DMACC, but I'm originally from a small town in southern Iowa. Being from a small town, especially in Iowa, I understand what it means to welcome guests from out of town and invite them in like family. This is exactly how my experience was in Minnesota. The coordinator, facility, students, and even judges welcomed me with open arms and gave me their full attention when it came to finding my spot or answering any questions I may have had. I instantly didn't feel as a stranger to the state, but as an honored guest. This made my experience more relaxing as I am a freshman in college and this was my first year in my school's Honors Program along with my first time, ever, presenting my research in front of judges. This was important to me because I was nervous, but also wanted to showcase my hard work and be taken seriously in my subject field.

Research has become a very important part in my college career and job field. I decided to study respiratory therapy because I have asthma and wanted to help those who suffer from its unforgiving lifestyle. I also encountered other respiratory problems with my sinuses along the way leading me to why I research. In the medical field, every treatment or medication is now being put through research-based medicine trials and research before it will be given to a patient. My research pertains to mostly respiratory therapy, but still is a vital part in the healthcare field for we cannot survive without our lungs. This avenue of research that I have embarked on has not only driven my passion for my career choice, but has given me many opportunities that without doing this research I would have never obtained. One opportunity happened to be the Winchell Undergraduate Research Symposium.

At the Symposium, I was able to learn a lot about myself and spread the knowledge of my field. Normally, I am shy and have a very hard time presenting to others. However, here, I broke out of my shell and realized I love to present, but mostly present information that can be relatable to others. The best example I can use is when you go to the doctor and they use every medical word under the sun. Most people just nod their head "yes," but with a confused look on their faces. My goal is to not use every medical or scientific word to make myself look smart, but to explain things to others that they would understand or relate to better because it makes the topic more interesting and allows them to gain something from my research than just a headache. My ability to break out of my shell has allowed me to now take my research and present at other institutions as well. I just sent my abstract to Las Vegas to present at the upcoming AARC (American Association for Respiratory Care) meeting. I now have a better understanding of the importance of research in this day and age, along with

# Student Perspective: Presenting at Winchell Undergraduate Research Symposium (Cont.)

the advancements it will lead to as I have seen them first hand in my state. I am a member of the respiratory care research committee and journal club at Iowa Methodist Medical Center, where I plan to be a therapist when I graduate.

Even though my program is only two years, I plan to take my studies further by getting my bachelors degree in science. Then I would either like to go to the University of Iowa and become a Cardiovascular Perfusionist or attend Des Moines University to become a doctor and eventually specialize in ENT (ear, nose and throat). Whatever direction I choose, I know for sure I want to be in the health field so that I can make the difference in the life of a patient and continue to research various topics of medicine to, maybe, one day find a cure to our deadliest component; lung cancer.

I look forward to coming to the Symposium next year and discovering more about myself as a presenter, but also about the research that my peers around me are doing. I can't thank the committee, facility, and judges, that helped to put together or participated in the Symposium, enough for their generosity and willingness to take time away from their families and lives to help us students pursue our dreams.

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## Recap: 2014 State Science & Engineering Fair

By Lise Weegman, Program Director

517 students in grades 6-12 displayed their scientific research and engineering design projects at the 77th Annual Minnesota Academy of Science (MAS) State Science & Engineering Fair. The State Science & Engineering Fair was held March 30 to April 1, 2014 in Bloomington, MN.

More than 275 professional scientists from industry, government, and academia volunteered to judge students on their scientific research methods or engineering design, their originality and creativity, clarity of expression, and knowledge gained from completing the project. Thanks to generous corporate and government sponsors, more than \$25,000 was awarded to outstanding students.

The State Science & Engineering Fair is more than just a competition—it introduces students to new ideas, encourages them to network with professional scientists, and inspires them to explore research topics of personal interest. In 2014, students enjoyed a keynote speech by Dr. Neville Hogan from the Massachusetts Institute of Technology. Dr. Hogan spoke with students about his research on robotics, human movement control, and rehabilitation engineering. In addition to the keynote speech, students participated in activities like Lego Robotics and Mine-craft, the 3M Visiting Wizards, and workshops.

Four projects were selected at the State Science & Engineering Fair to join the

Minnesota delegation from the eight regional science fairs around the state to compete in the Intel International Science & Engineering Fair (Intel ISEF), held in Los Angeles, California, May 11-16, 2014.

Intel ISEF, the world's largest international pre-college science competition, provides an annual forum for approximately 1,700 high school students from more than 70 countries, regions, and territories to showcase their independent research as they compete for more than \$5 million in awards and scholarship. Intel ISEF is the premier global science competition for students in grades 9–12.

How do kids from over 70 countries meet 1700 other students? A massive pin

# Recap: 2014 State Science & Engineering Fair (Cont.)

exchange and plenty of food broke the ice on Sunday evening, May 11. Students began mingling, meeting their newfound friends and old acquaintances from previous years. Thus, the week began!

The opening welcome ceremony on Monday, May 12 was hosted by Kyle Hill, *Discover Magazine* science writer and TV correspondent. The co-host was Christina Ochoa Lopez who is the grand-niece of Nobel Laureate, Severo Ochoa. This year's keynote speaker was Mick Ebeling, Founder and CEO of Not Impossible, LLC, an organization that develops creative solutions to real-world problems, then produces media to ensure those solutions take flight.

The student projects were judged all day on Wednesday, May 14. The Special Awards Ceremony was held on Thursday evening and the Grand Awards Ceremony was on Friday morning. Of the 37 students representing Minnesota, 10 received special and/or grand awards. Of the four projects advancing to Intel ISEF from State, three projects won Grand Awards: Jonah Butler (2<sup>nd</sup>), Priyanka Narayan (3<sup>rd</sup>), and Michelle Campeau (4<sup>th</sup>). More information about the student award winners can be found on our website at [www.mnmas.org](http://www.mnmas.org).

Symposia were offered all week long throughout the day for



*Members of the Minnesota delegation to Intel ISEF with Lise Weegman*

*Photo courtesy of Lise Weegman*

students and adults, including workshops specifically for fair directors or teachers. Workshop topics ranged from protecting intellectual property, to a panel discussion on excellence in science, to an interview with Nobel Laureate Dr. John Mather. Other fun things that the Intel ISEF organizers had planned for all were a night at the LA Live Complex, an evening in Universal Studios Hollywood, and trips to museums and the Santa Monica Pier.

A busy (sometimes stressful for students) educational, very successful and fun experience was had by all!

In 2015, the State Science & Engineering Fair and North Central Regional JSHS will reverse order at the Doubletree Hotel. The State Science & Engineering Fair will be held first (Fri/Sat/Sun March 20-22) and North Central Regional JSHS will be held second (Sun/Mon March 22-23). Stay tuned to [www.mnmas.org](http://www.mnmas.org) for updates.

## **Congratulations to the following students from Minnesota who received awards at Intel ISEF:**

**Alanna Bram**  
Rochester Region

**Jonah Butler**  
Southern Region

**Michelle Campeau**  
Rochester Region

**Carolyn Jons**  
Twin Cities Region

**Matthew Lerdahl**  
Central Region

**Priyanka Narayan**  
Twin Cities Region

**Christine Neumann & Crystal Moynan**, Northeast Region

**Tim Renier**  
Northeast Region

**Jason Sylvestre**  
Twin Cities Region

# In Photos: 2014 State Science & Engineering Fair

Photos by Dave Newell



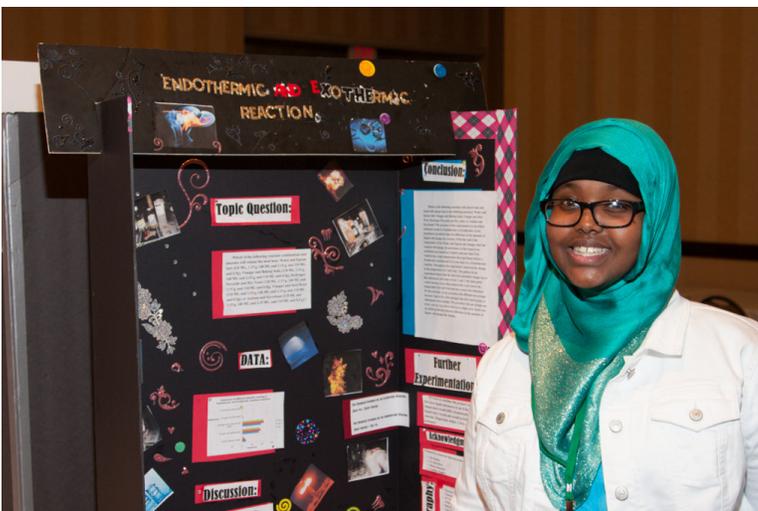
Max Derbyshire from Winona Middle School presents his research on light reflection



Students participate in the Lego Robotics activity



Winners of the Beckman Coulter awards for science and engineering



Sundus Mohamed presents her research on Endothermic and Exothermic Reactions



Judge Scott Warmka from Seagate interviews Gabrielle Olson from New Ulm about her research

# Student Perspective: Middle School Seagate Rising Star Award Winner

By Andy Eggebraaten, John Adams Middle School (Rochester)

My idea for my science fair project came when I was reading a magazine article about prosthetic hands and the problems they have controlling them. I started brainstorming ideas about better ways to control them and I thought of verbally telling the hand what to do. That's how I started testing voice recognition to control my robotic hand.

At the Minnesota State Science & Engineering Fair I competed with all the other regional winners and talked with the judges. The judges did a great job telling me what aspects of my project I did well and what needs improvement. Some judges gave me great advice on how to improve my project such as what to use for the tendons on my robot and what I should add to make my project better. I learned a lot from them.

I was so excited when my name was announced for the Seagate Rising Star award that at first I didn't believe it. I appreciated how Mr. Neu took the time to describe my project in detail. I have decided to use part of the award money to buy a Mac laptop computer because I want to learn how to design and program apps, and you need a Mac to write apps for iOS devices. I am going to use the rest of the award money to build onto my robotic hand for next year's science fair project.

As part of the Rising Star award, Seagate invited me to their labs for a tour and to present my project to some of their engineers. This was a great experience for me because I was able to talk to engineers that actually build and use robotics in their daily jobs, and see some of the latest technology and research that I found amazing. It is a day that I won't ever forget.

I have lots of plans for next year's project. I am going to enhance my robotic hand so it can be controlled wirelessly from an app running on my phone, and build stronger fingers and wrist motions. I also plan to experiment with tactile feedback so that the fingers can sense when they have grasped an object.

It is so wonderful that companies donate to the Minnesota State Science & Engineering Fair every year. It is important to me and other students that we can present our research and show our science skills and get rewarded for our hard work.



*Andy Eggebraaten explains his project Photo by Dave Newell*

# Top Student Award Winners from the 2014 State Science & Engineering Fair

| Award   | Amount                         | Winner                               | Project   |
|---|--------------------------------|--------------------------------------|---|
| ISEF Award  | All-expenses-paid trip to ISEF | Claire Simpson                       | Towards a Total Synthesis of Novel Anti-cancer Molecule Drimentine C  |
| ISEF Award  | All-expenses-paid trip to ISEF | Jonah Butler                         | Employing In Situ Generated Peracetic Acid And Fungal Biosynthesis To Produce Biofuels  |
| ISEF Award  | All-expenses-paid trip to ISEF | Michelle Campeau                     | Comparative Evaluation of Electrical Strategies for Eradication of Staphylococcus epidermidis Biofilms  |
| ISEF Award  | All-expenses-paid trip to ISEF | Priyanka Narayan                     | Understanding the Mechanism Behind Nanoparticle Enhanced Oral Absorption of Chemotherapeutic Drugs  |
| Seagate Rising Star Award                         | \$2,000                        | Alanna Bram                          | Determination of Factors that Impact Clearance of Suspended Particulate Matter (Dust) in Air  |
| Seagate Rising Star Award                         | \$1,500                        | Andy Eggebraaten                     | A Study of Using Speech Recognition to Control a Robotic Hand   |
| 3M Innovation Award                               | \$1,000                        | Easton McChesney & Wolfgang Ofstedal | Protecting Streams, Lakes, and Rivers: Engineering a Breakthrough Filter to Remove Phosphates from Stormwater Runoff                                  |
| 3M Innovation Award                               | \$1,000                        | Pujan Patel                          | The Effectiveness of Regenerative Shock Absorbers against Fuel Economy and Carbon Dioxide Emissions   |
| University of Minnesota College of Pharmacy Award | \$1,000                        | Annie Sun                            | Tumor-Induced Depletion of Lymphocytes and Mechanisms of Tumor Immune Evasion   |
| University of Minnesota College of Pharmacy Award | \$1,000                        | Brian Yang                           | Reducing Cancer Metastasization With Heterocyclics  |
| 3M Innovation Award                               | \$750                          | Jonah Butler                         | Employing In Situ Generated Peracetic Acid And Fungal Biosynthesis To Produce Biofuels  |
| 3M Innovation Award                               | \$750                          | Steven Franklin                      | Audio Game: Adapted Video Game for the Visually Impaired  |
| Ecolab Foundation Food Safety Award               | \$700                          | Ezra Grothe & Richard Sather III     | The Design and Development of an Innovative Multi-Modal Device to Improve Hand Hygiene Rates in Health Care Facilities                                |
| Ecolab Foundation Green Award                     | \$700                          | Patricia Zhao & Madison Ernst        | Targeting Toxic Waste in Soil and Aquatic Environments: Investigating Chemotactic Response of Pseudomonas putida F1                                   |
| General Mills Food & Nutrition Award              | \$700                          | Elisa Villafana                      | Save the Honeybees: Stop Using Neonicotinoids: Effects of the Pesticide Thiamethoxam on Vigor, Growth, and Development of Soybean (Glycine max) crops |
| Ecolab Foundation Food Safety Award               | \$700                          | Avni Jain                            | Allergen Alert! An Innovation to Assist People with Finding Safe Food Choices   |
| Ecolab Foundation Green Award                     | \$700                          | Sophia Feller                        | The Effect of Different Chemicals in Lake Water on the Chemotaxis of Physarum polycephalum (Slime Mold)   |
| IFT Minnesota Section Award                       | \$500                          | Heather Stone                        | Globally Utilizing Perennial Intermediate Wheatgrass  |
| Ecolab Green Award                                | \$700                          | Rena Weis                            | Impacts of Biochar on Soil Greenhouse Gas Emissions, Soil Moisture, and Crop PAH Concentration  |

# Top Student Award Winners from the 2014 State Science & Engineering Fair (Cont.)

| Award   | Amount | Winner                               | Project   |
|---|--------|--------------------------------------|---|
| The Pentair Foundation Award  | \$500  | Madison Pallin                       | St. Louis River Estuary: The Use of Lidar Imagery to Evaluate Spring Creeks Sediment Load and the Effect of Location and a Large Storm Event on the Overall Water Quality Within the Lake Superior/St. Louis River/Spring Creek Watershed |
| 3M Innovation Award   | \$500  | Ishaan Govindarajan                  | The "Sense-ational" Sock- Developing a Sensory Sock for Patients with Peripheral Neuropathy   |
| IFT Minnesota Section Award   | \$500  | Harmanpreet Kaur                     | Comparing Calcium in Various Types of Milk Used in Human Consumption  |
| The Pentair Foundation Award  | \$500  | Michael Luoma                        | Effects of Corn Residue and Soil Type on Phosphorus Leaching  |
| 3M Innovation Award   | \$500  | Ben Chrepta                          | Improving and Testing Robotic Arm Kinesthetics with the use of Processing, Kinect, and Arduino  |
| General Mills Food & Nutrition Award  | \$500  | Avni Jain                            | Allergen Alert! An Innovation to Assist People with Finding Safe Food Choices   |
| Beckman Coulter Award   | \$350  | Ezra Grothe & Richard Sather III     | The Design and Development of an Innovative Multi-Modal Device to Improve Hand Hygiene Rates in Health Care Facilities  |
| Beckman Coulter Award   | \$350  | Trevor Larsen & Nath Samaratunga     | Using Histology to Investigate Stem Cells as a Treatment for Bronchiolitis Obliterans   |
| Beckman Coulter Award   | \$350  | Andy Eggebraaten                     | A Study of Using Speech Recognition to Control a Robotic Hand   |
| Beckman Coulter Award   | \$350  | Luke Gentle                          | Following the Flow of Flubber   |
| IFT Minnesota Section Award   | \$250  | Sunghee Lee & Joseph Vallin          | Oxygen vs. Ethylene: Optimizing the Fastest Fruit Ripening Environment  |
| The Pentair Foundation Award  | \$250  | Easton McChesney & Wolfgang Ofstedal | Protecting Streams, Lakes, and Rivers: Engineering a Breakthrough Filter to Remove Phosphates from Stormwater Runoff  |
| IFT Minnesota Section Award   | \$250  | Natalie Daly                         | How Does Fat/Fat Substitute Type in Cookies Affect Taste, Texture, and Appearance   |
| The Pentair Foundation Award  | \$250  | Brittney Kuntz                       | Differences in Chloride Concentration in an Urban Stream by Season & Site   |
| SPIE Optics and Photonics Science Fair Award  | \$250  | Carolyn Jons                         | Improved Efficiency of Steam Generation Using Carbon Nanoparticles  |
| Penny Lohman Memorial Award   | \$250  | Avni Jain                            | Allergen Alert! An Innovation to Assist People with Finding Safe Food Choices   |
| WSB Engineering Excellence Award  | \$250  | Max Ylitalo                          | Garbage Reduction to Energy Production Converting Waste Paper to Cellulosic Ethanol   |
| Minnesota Environmental Health Association Excellence in Environmental Health Science Award | \$200  | Tim Renier                           | Hand Hygiene Gone Viral? A Study of Student Involvement in a Social Media Campaign as a Method of Bringing Hand Hygiene to the Masses   |

# Now and Then: A Judge Reflects on His Science Fair Experience

By Gary Caple, Medtronic

Black, genuine imitation leather notebook in hand, I stood gazing at the young students aghast at the sight of the puddle of twisted spaghetti noodles on the carpeted floor in front of me. “Clean-up on the Earth Science display aisle” I thought to myself as I wondered “was it the food, the flu or just a case of pre-judging jitters?” as I redirected my travel path away from the unfortunate vomit back to the science fair judging room. Making my way to the seclusion of the judging room I picked my way through the aisles of young, anxious faces. Some were sitting, some were standing, some rose from their seat in anticipation that I might be there to judge their project as I approached and then passed by their project display. The young faces (and yes, the spaghetti on the floor) brought back memories of 1968, the year I made my first presentation at the Minnesota High School Science Fair.

The science fair was a first on many levels for me. It was the first time of experiencing a reward for effort spent for 6 months of before school, after school, and weekends working with my mice as a part of my science project. It was spending a weekend with fellow high school classmates at the science fair in an upscale hotel away from home. It was the gut wrenching presentation before a panel of judges who listened with intent as I described my work and my conclusions. It was the excitement I felt as I heard my name read at the awards ceremony as a recipient of a trip to the National Junior Science & Humanities Symposium. It was a year of firsts, which was repeated again in 1969. I still look back on the memories of the two science fairs and the two Junior Science & Humanities Symposiums, the kids I met, and having the chance to sit down and have a conversation with the noted space scientist Dr. James Van Allen who asked me about my research – what a boost.

Historically, I had long been interested in the sciences, especially biology and chemistry. It was not until my junior year in high school that Mr. Michaels, the Biology II instructor, encouraged me to take my curiosities to a new level and work on an independent science project. His guidance and encouragement cemented my career in STEM.

Entering Mankato State College in the fall of 1969, the pursuit of the sciences continued. After graduation (and a brief eight year detour in the career plans) I returned to college, this time at Central Missouri State University and earned my master’s degree in Industrial Hygiene. Not unlike Forrest Gump sitting on that bus bench holding a box of chocolates, not long after graduation, Dr. Bill Bessler at Mankato State University tracked me down and invited me to be a judge at the Regional Science Fair held in Mankato. It was like returning home after a long journey. Today, some 30+ years later, the annual rite of spring is not marked by the ice out on Minnetonka (well, not entirely true as the open water and thoughts of walleye call to me) but rather by the opportunity to participate in the science fair.

In addition to judging, this past year was another “first” as I was asked to host a table at the JSHS Breakfast with the Scientists. Huh - - me a scientist. Never thought of myself in that light but it was again a memorable experience having the opportunity to sit with high school students who were actually interested in how I got to where I am and have one-on-one conversations about their research and questions they have about careers in STEM as they approach the college decision.

One of the few certainties in life is change. Companies across the nation are all feeling the economic pinch and my current employer is certainly one of them. While no longer providing direct funding to the Minnesota Academy of Science, my employer (Medtronic) instituted a matching grant program for volunteer work. The program goes something like if you volunteer 25 hours for a listed organization,

# Now and Then: A Judge Reflects on His Science Fair Experience (Cont.)

the company will write a \$500 check to the organization. Working with Lise Weegman and Jana Nash at the Minnesota Academy of Science, they came up with 25 hours of volunteer work to bolster the hours donated so I could obtain a matching grant from my employer. Working with Celia Waldock, I was able to direct the funding toward scholarship monies for young scientists who cannot afford the science fair registration fees.

Times are a-change'n. Recently I read an article that stated in the United States, one in twenty college students will go into a STEM career while in some foreign countries, one in four will go into a STEM career. This is a historic low for the United States in students looking at STEM as a career choice. Looking back, the J.B Michael's and the James Van Allen's of the world were the inspiration, and the mentors who helped shape my career. I never realized until later in life how much influence a mentor can have or just how much a comment or words of encouragement can mean in shaping one's career. I think now, more than ever is my opportunity to "pay it back" and to thank to those who helped shape my career and subsequently my life.

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## Recap: 2014 North Central Regional Junior Science & Humanities Symposium

By Lise Weegman, Program Director



*Maktal Mohamed and Adam Adan from the Al-Amal School prepare to present their microbiology research*

*Photo by Dave Newell*

At the 45th Annual North Central Regional Junior Science & Humanities Symposium (JSHS), hosted by the Minnesota Academy of Science, students competed for scholarships and an opportunity to present at the National JSHS

competition, sponsored by the research arm of the Department of Defense.

From March 29-30, 85 students from 31 schools convened in Bloomington, MN for JSHS. Students presented a total of

69 scientific research papers in front of panels of expert judges from industry, government, and academia. Top students from the afternoon rounds advanced to the final round in the evening. At the end of the callback round, the judges chose Carolyn Jons, a sophomore at Eden Prairie High School, as the 1st place winner of the North Central Regional JSHS. Carolyn advanced to National JSHS along with four other students: Tim Renier, Alanna Bram, Kevin Zheng, and Matthew Lerdahl.

The Keynote Speaker for North Central Regional JSHS was Dr. James McCarthy from the University of Minnesota Medical School. Dr. McCarthy spoke to students about working in the medical sciences, explained his cancer research, and answered questions about his career.

# Recap: 2014 North Central Regional Junior Science & Humanities Symposium (Cont.)

Ten professional scientists and researchers volunteered for Breakfast with the Scientists to discuss their work with students and answer student questions.

From North Central Regional JSHS, in April, the top five papers and families of the top two oral presenters flew to National JSHS for the national competition.

The 52nd National Junior Science & Humanities Symposium was held in Washington, D.C. April 23-27, 2014. Along with the five delegates from North Central Regional JSHS that I chaperoned, Carolyn Jons' mom and dad, Karilyn and Steve Jons, along with Tim Renier's parents, Dr. Hugh and Kris Renier were able to attend as well. We had a wonderful time. The National

JSHS brought together 230 high school students who qualified for attendance by submitting and presenting original scientific research papers in regional symposia held nationwide. Adult leaders—high school teachers, university faculty, ranking military guests, and others attended and joined together to encourage this future generation of scientists and engineers by celebrating student achievement in the sciences.

The top two regional delegates (Carolyn Jons from Eden Prairie, MN and Tim Renier from Duluth, MN) competed for military-sponsored scholarships by presenting their research in oral sessions and all other regional delegates (Alanna Bram, Kevin Zheng and Matt Lerdahl) presented their

research in poster sessions at the USA Science & Engineering Festival (USASEF), Walter E. Washington Convention Center.

Carolyn Jons took first place in Chemistry and was awarded a \$12,000 undergraduate scholarship for her research on "Improved Efficiency of Steam Generation Using Carbon Nanoparticles."

## Thank you to Breakfast with the Scientists volunteers:

**Dr. Andrew Barnes**  
University of Minnesota

**Gary Caple, M.S.**  
Medtronic

**Dr. Daryl Ellison**  
MN Dept. of Natural Resources

**Jill Granger, M.S.**  
Beckman-Coulter

**Dr. Daniel Harki**  
University of Minnesota

**Dr. Abdullah Jaradat**  
USDA Agricultural Research Service

**Dr. Dana Morrone**  
University of Minnesota

**Dr. Deborah Mullen**  
Park Nicollet Health Partners

**Dr. Mark Nelson**  
USDA Forest Service

**Dr. Gregory Park**  
University of Minnesota



*Students from Breck School gather after their JSHS presentations*

*Photo by Dave Newell*

# Recap: 2014 North Central Regional Junior Science & Humanities Symposium (Cont.)

Keynote speakers throughout the week included Dr. Lawrence Schuette, Director of Research (Discovery & Invention) at the Office of Naval Research, Dr. Leigh McCue, from the Department of Aerospace and Ocean Engineering at Virginia Tech, and Christopher J. Cassidy, Commander, USN, NASA Astronaut and for the banquet and awards ceremony, Tri-Service representatives.

Students had some fun with team building activities on Friday night, and Saturday, all participants were able to enjoy the day on the mall at the Smithsonian museums, and/or

at the USA Science Fair Expo hosted by the principal sponsor, Lockheed Martin, along with a grassroots collaboration of over 1,000 leading science and engineering corporations in the United States. Exhibitor participation in the Grand Finale Expo (26-27 April 2014) featured Army/Navy/Air Force STEM programs and innovative, hands-on technology displays sponsored by the Office of the Secretary of Defense. National JSHS concluded with some dance entertainment for the students on Saturday evening, before we all departed early Sunday morning.



*Carolyn Jons winning first place Photo courtesy of Lise Weegman*



*The Minnesota delegation to National JSHS along with Lise Weegman and parents Photo courtesy of Lise Weegman*

# Preparing for College by Participating in JSHS and Science Fair

By Madison Pallin, Cloquet High School



*Madison Pallin presents her research on the St. Louis River at JSHS*

*Photo by Dave Newell*

While watching my brother and sister grow up with science fair, it began to click in my head that maybe I should do science fair, as well. Knowing everyday how rewarding it was to them, I started expanding my thoughts that I should try a research project of my own. In seventh grade, every student has to do a research project of their personal choice. My project was focused on what type of staining product would remove certain stains the best. After being awarded first place and the opportunity to go to state, I eventually knew this was my calling. At the approach of eighth grade I talked to my

mentor Dr. Cynthia Welsh and chose to do research that was more complex. However, the most important thing in picking your research topic is to do something that you're interested in. Knowing my personality and the things I like to do, I was able to decide on my project: maintaining a rain garden. As I grew older, I took the appropriate steps to expand my research into things that better challenged me physically and emotionally.

The biggest difference I think between JSHS and science fair is that science fair is more relaxed. You have to know your material but on the other hand the judges are there to see your project and to see what you have accomplished. Science fair is also an opportunity for you to meet new people, but it's also for you to get rewarded for your research and hard work. JSHS is more challenging. You are in a room with seven to eight judges and in twelve minutes you have to explain your entire project from start to finish. I feel JSHS has a harder criteria level, making it more challenging, but still stimulating. JSHS better connects us with the judges, allowing us to get good feedback, ultimately finding out aspects of our project that are weak or strong. JSHS is also set up differently because you're presenting off a Power Point Presentation in front of the room compared to a board presentation where the judges walk by and ask questions.

The opportunities that I have had are things that not every kid can experience. Going to science fair and competing with my project has given me the chance to travel around the United States. I cannot even keep track of the places that I have traveled. I know I would never have traveled to some of these places without science fair. The rewarding side to science fair greatly depends on how good your project is. This is ultimately based off of time and commitment. The most rewarding thing of all to me is being awarded certificates, which I can include in my college resume. Science fair has also improved my confidence level as I present in front of others, helping me with physical presentation skills, speaking skills as well as analytical skills. I truly believe that what I have gained from doing science fair will benefit me as I go on to college.

# Preparing for College by Participating in JSHS and Science Fair (Cont.)

The comparison between the American Indian Science & Engineering Fair and the State Science & Engineering Fair is that they are both there to help kids learn about what they can do to improve their projects and research and to reward them for their hard work and dedication on their projects. Both the fairs were also good supporters of what we, as young kids, are trying to accomplish. The fairs also help us all become better public presenters in the future.

With next year's research topic I will continue studying the St. Louis Estuary and rain gardens, but there will be a bigger piece thrown into the project. I plan on going to college right away and the reason I chose this project is to get me headed in the direction of actually doing my research that could potentially turn into a job. My interests are marine biology, or a field dealing with fresh water, however on a different note I have also thought of exploring the field of veterinary medicine. My interest in marine biology and fresh water peaked while working on and presenting my projects. I was able to dig deep and find what I am truly interested in.

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## Recap: Minnesota State Regional Science Bowls

By Barbara Donoho, Program Manager

The Minnesota State Regional Science Bowl for high school and middle school students, overseen by the Minnesota Academy of Science, held its annual tournaments earlier this year. Hundreds of students representing dozens of middle schools and high schools from all over the state of Minnesota tested their knowledge of all major areas of science and mathematics. Students competed in five-person teams to solve technical problems and answer questions in all branches of science and math. The two tournaments are conducted in a fast-paced question and answer format. Teams go head-to-head to buzz in and answer questions just like the TV show Jeopardy.

The 20<sup>th</sup> annual Science Bowl for high school students was Friday, January 24, 2014 in Olin-Rice Hall at Macalester

College in St. Paul.

Thirty-two teams of students from 22 different schools participated in the event. Originally, 23 different schools were approved and registered to compete, however, during the check-in on the day of the competition, one team

was missing two players due to illness and needed to be replaced by a "wait list" team. Teams were composed of four team members and one optional alternate, and led by one coach. Four students on each team competed at all times during the tournament.



*Eden Prairie High School Team 1 (A) and Cathedral High School Team 1 (B) wait for their match to begin* Photo by Eliza Grames

# Minnesota State Regional Science Bowls (Cont.)

The first place team was from Wayzata High School Team 1. They received a team trophy, the 2014 Regional Champion banner, individual medals, and an all-expense-paid trip to Washington, D.C. where 69 high school teams competed with other regional winners for the national title in the DOE National Science Bowl (NSB) finals, April 24-28. Second place went to Wayzata High School Team 2. They won individual medals. St. Paul Central High School took 3<sup>rd</sup> place honors with individual medals. Minnetonka High School Team 2 won the Civility Award, which is given to the coach and team that best represent the positive aspects of competition, whether winning or losing.

Amanda Laden, the coach of both Wayzata High School teams, accompanied her regional winning team to compete in the NSB competition. At the NSB, Wayzata won several of their round robin competitions.

Seventy scientific professionals from many educational institutions and scientific companies volunteered over 500 hours to organize and staff our competition. They served as planning committee members, proofreaders, moderators, scorekeepers, timekeepers, scientific judges, runners, and set up/take down workers. Many volunteers were familiar with the details of the event as 71% of them returned from previous Science Bowls.

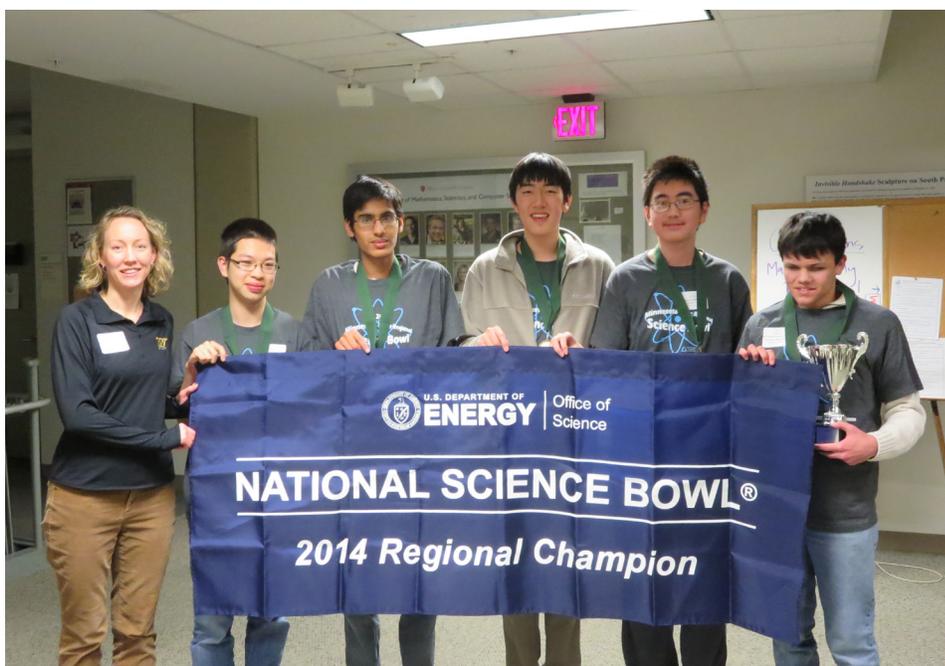
“[Attending nationals] was an eye-opening experience. It was very fun, with visits to the National Mall and monuments. The lectures given at the competition by researchers were all very intriguing, ranging from large x-ray lasers to reconstructing digital versions of old sound recordings. My favorite part though was the competition. There, I saw the level of play at the national level. The other teams were much faster at buzzing than ours, and took more risks. In addition, the questions were much harder than those at the state level, though the state level questions helped us prepare for the national ones. Going against the top teams in the US was a difficult, but enjoyable experience.”  
—William Zeng

The 7<sup>th</sup> annual Science Bowl for middle school students was Saturday, February 15, 2014 at the Brady Educational Center at the University of St. Thomas – School of Engineering.

Twenty-four teams of students from 16 different schools participated in the event. 119 students and 22 coaches participated. There was one new school participating for the first time: Scott Highlands Middle School from Apple Valley.

The first place team was from Eden Prairie Central Middle School Team 1. They received a team trophy, the 2014 Regional Champion banner, individual medals, and an all-expense-paid trip to Washington, D.C. to compete against 46 other regional winners in the DOE NSB finals, April 24-28.

Second place went to Wayzata West Middle School Team 1. They won individual medals. Wayzata Central Middle School Team 1 took 3<sup>rd</sup> place honors



Wayzata High School Team 1 and coach Amanda Laden with the 2014 Regional Champion banner

Photo by Eliza Grames

# Minnesota State Regional Science Bowls (Cont.)

with individual medals. Wayzata Central Middle School Team 2 won the Civility Award.

Bill Prem, Eden Prairie Central Middle School Coach, accompanied his team to NSB where the team successfully won their Round Robin matches and moved into the Double Elimination competition. Several parents of the students also attended the event.

Fifty-five scientific professionals from many educational institutions and scientific companies volunteered over 375 hours to organize and staff the competition. They served as planning committee members, proofreaders, moderators, scorekeepers, timekeepers, scientific judges, runners, and set up/take down workers. Many volunteers were familiar with the details of the event as 51% of them returned from previous Science Bowls.

The Minnesota State Regional Science Bowls are held annually and are overseen by the Minnesota Academy of Science. The U.S. Department of Energy (DOE) Office of Science National Science Bowl accepts applications from more than 115 middle and high school regional competitions. The Minnesota event follows the specifics outlined in the NSB Coordinator's manual. The Department of Energy (DOE) and Oak Ridge Institute govern the National competition for Science and Education (ORISE). The DOE

outlines all materials, including detailing roles for participants, volunteers, and the coordinator.

The Minnesota State Regional Science Bowls were made possible by the generous donations and resources of our

sponsors: Macalester College, University of St Thomas – School of Engineering, Ecolab, General Mills, Great River Energy, Pentair, Subaru, UTC Aerospace Systems, 3M, the Tennant Foundation, and the Hardenbergh Foundation.



*Dr. Colin Brownlow and other volunteers prepare for the final round between Eden Prairie and Wayzata West*

*Photo by Eliza Games*



*The winning team from Eden Prairie Central Middle School with coach Bill Prem*

*Photo by Eliza Games*

# What I've Learned in Four Years of Science Bowl

By William Zeng, Wayzata High School



*William Zeng (Player 1) and his teammates before the start of the final round*

*Photo by Eliza Grames*

I am very glad that I had the opportunity to participate in Science Bowl for the past four years. Back in ninth grade, one of my upperclassmen friends invited me to a Science Bowl practice. At that time, I knew very few answers to the questions asked, and even if I did, the upperclassmen were much faster buzzers than me. However, I found it fun to practice, and at the state tournament, my team, which was composed solely of ninth graders, made it into double eliminations. I was propelled by this early achievement to continue participating in Science Bowl. At this time, I started taking science classes at my high school and the University of Minnesota, and I was happy to find that my knowledge helped me immensely in Science Bowl. Slowly, the

questions started making sense, and I knew how to answer the majority of the questions in practice and tournaments. I also became faster at buzzing, and more able to judge when and when not to interrupt. After four years, our team was able to make it to Nationals.

Another thing I learned by participating in Science Bowl is some of the careers available in the science field. The moderators, timekeepers and scorekeepers in the state tournament had jobs at Seagate, Medtronic, and several other local companies. By talking to them, I had a larger perspective on the opportunities available if I continued to study science. Over time, I found that biology was my favorite and best subject, and I became interested in a medical career. Even so, I enjoy studying all fields of science and seeing the careers available in other fields.

Nationals was an eye-opening experience for me. It was very fun, with visits to the National Mall and monuments. The lectures given at the competition by researchers were all very intriguing, ranging from large x-ray lasers to reconstructing digital versions of old sound recordings. My favorite part though was the competition. There, I saw the level of play at the national level. The other teams were much faster at buzzing than ours, and took more risks. In addition, the questions were much harder than those at the State level, though the state level questions helped us prepare for the national ones. Going against the top teams in the US was a difficult, but enjoyable experience.

Our teams mainly practiced by playing practice rounds with each other. A member would read questions while the teams buzz in to answer. In addition, Wayzata organized a practice tournament. The practice tournament was very helpful in that it was practice for state and helped improve the teamwork of my team. The final round of the state tournament was very close, with our second team beating us in one round.

I have always found the state tournament to be a great experience in my four years there, and I hope that it continues to be fun for future Science Bowl students.

# Recap: High School STEM Communicator Awards

By Karen Newell, Program Manager

Many awards and competitions recognize math and science students for their research skills, but few recognize the importance of written communication skills for future scientists. The High School STEM Communicator Awards program seeks to identify students who not only conduct rigorous scientific research, but also can communicate the results of their research well.

Applicants for the High School STEM Communicator Awards completed investigative research projects that explored a current issue relating to science, mathematics, technology, or society. All of the applicants are Minnesota students who have taken three years of science and math, including class work in biology or environmental science, chemistry, physics, and advanced mathematics.

In 2014, 27 students submitted research papers to the High

School STEM Communicator Awards program. Papers were reviewed by 32 volunteers who put in over 125 hours to read and respond to student work.

When reviewing papers, technical writers used a series of readability tests to assess accessibility of the papers and writing style. The results of these tests were shared with students to identify areas to improve their scientific writing. Professional scientists from industry, government, and academia reviewed the papers for scientific content and clarity in writing. Students received feedback from the reviewers to improve their future scientific studies and research papers.

The top 10 papers submitted to the competition received a \$200 cash award, certificate, and medal. Additionally, the top 10 papers are eligible for publication in the Minnesota Academy of Science Journal of Student Research. Thanks

## Top 10 papers

Neehar Banerjee

Claire Drysdale

Luis Guzman & Julia Joern

Sofie Kim & Jacob Levy

Matthew McMillan & Peter Metzger

Amrita Mohanty

Priyanka Narayan

Elisa Villafaña

Elliott Weiler

Patricia Zhao & Madison Ernst

to a grant from the St. Jude Medical Foundation, we were able to increase the amount of prize money for award winners and were able to invite all of their parents to the awards ceremony.

# Retiring from the Minnesota Academy of Science After 12 Years

By Pat Strandberg, Office Manager

I came to the Minnesota Academy of Science not knowing what to expect but also not realizing for whom I was working. My hiring was a pretty muddled experience. Many facets of my job were unclear and any direction I received was very minimal. And yet I accepted the position!

In the almost twelve years I've been with the Academy, I've seen many changes and much evolution. There were two years when we had no Executive Director and the person who was the State Science & Engineering Fair/JSHS Director took on both roles. He met with funders and solicited grants as well as the never-ending duties of the Fair Director. It was a rocky ride but our Board President steered the Academy onward and out of troubled waters.

In 2007, when our current Executive Director and the Director of the State Science & Engineering Fair and JSHS were hired, things started stabilizing. Our programs not only survived, but flourished. With good leadership, the Academy has expanded its programs to include Science Salon, which attracts professional scientists to special events throughout the year.

My favorite part about working at the Academy has been the exposure to all those brilliant young minds whose abstracts I rarely understand! Or sitting in a session of Science Bowl, trying to guess the answer when I can't even understand the question! Being among these bright kids gives one hope that our world does have a bright future. Now if we could just get the media to quit bombarding us with negative news feeds.

Working for the Academy has been an interesting ride. I've enjoyed the people I've met and worked with over the years and will continue to follow the success of the Minnesota Academy of Science.



*Pat Strandberg organizing the Back Office at JSHS* Photo by Dave Newell

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## Staff Changes



Kris Zierman (left) has joined the Minnesota Academy of Science as Administrative Manager and will provide support for all programs and administrative functions. Kris brings years of development, fundraising, public relations, event, hospitality, office management and volunteer coordination experience. She has an extensive background in non-profit environments.

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After Megan Buchanan left the Academy, Eliza Grames took over as Annual Meeting Coordinator and Data Manager in addition to her role as Communications Specialist.

# White House Science Fair

By Connor Klemenhagen, University of Minnesota

Semester over, boxes packed, truck loaded and ready to return home for the summer, my phone vibrated and I checked the alert before driving off. It was an email, and the subject line said it all: "White House Science Fair." I was in disbelief.

Months earlier I had received an email from the Office of Science and Technology Policy for the White House, which was reaching out to the winners of many different STEM (Science, Technology, Engineering, and Math) competitions for more information on their background and projects. I replied to that email with full knowledge that they were selecting for the White House Science Fair, an event started by President Obama just years earlier with the goal of encouraging youth STEM participation. I had multiple friends who had been invited to present at the first few fairs, but they were far more interesting and accomplished than me. I'm just a white male from suburban Minnesota, so I had zero expectations of hearing back. Well, I was wrong. I did hear back. And in a matter of minutes, my mind shifted from final exams and plans to start my summer, to prepping for the most important science fair of my life.

Although I may not appear to have the most inspiring demographic, I can certainly claim that my research has taken me on a journey more unique than most students you will meet in science fair. I have worked on the same project since middle school, and have continued my research on the ecological development of drought tolerant turfgrass mixtures through college. But, there were many points in my science fair career when I considered ending my project. Some years I never won an award, and I was sacrificing so much of my time and energy for my research. Fortunately, I didn't quit, because in May of my senior year I won 1st place at the National JSHS (Department of Defense) competition, which came with a \$12,000 scholarship that made it possible for me to attend college.

Now, the same professor who advised me during my senior year of high school is my boss in the University of Minnesota Turfgrass Science Department. Our work to educate the public about more sustainable lawn options has taken me to new heights, such as converting the governor's lawn to a low-maintenance grass.

I have also returned to my district and state science fairs to volunteer, and give back to the organizations which gave so much to me. I sincerely hope that schools and districts across the state and nation will realize that science fair projects are the best form of STEM education we can offer. I never would have imagined presenting my research at the White House, but my science fair project made that a reality.



*Connor Klemenhagen explains his research to attendees of the White House Science Fair*

*Photo courtesy of Connor Klemenhagen*

# Thank You to Our Funders and Corporate Sponsors

3M Foundation  
Academy of Applied Science  
American Chemical Society  
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Ecolab Foundation  
General Mills Foundation  
Great River Energy  
Gustavus Adolphus College  
Hamline University  
Hardenbergh Foundation  
Insurance Center of Buffalo

Macalester College  
North Hennepin Community College  
Pentair Foundation  
Seagate Technology  
St. Jude Medical Foundation  
St. Mary's University of Minnesota  
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Tennant Foundation  
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UTC Aerospace Systems

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## Newsletter Production Team

Celia Waldock, Managing Editor  
Eliza Grames, Production Editor  
Karen Newell, Production Assistant  
Pat Strandberg, Office Manager

### Contributors

Nicole Benhart, Des Moines Area Community College  
Gary Caple, Medtronic  
Barbara Donoho, Minnesota Academy of Science  
Andy Eggebraaten, John Adams Middle School

Eliza Grames, Minnesota Academy of Science  
Connor Klemenhausen, University of Minnesota  
Madison Pallin, Cloquet High School  
Celia Waldock, Minnesota Academy of Science  
Mike Williams, 3M  
Caroline Ylitalo, 3M  
William Zeng, Wayzata High School

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### Minnesota Academy of Science

8700 West 36th Street • Suite 114W • St. Louis Park, MN 55426  
Phone: 952-545-6789 • Fax: 952-545-6336  
contact@mnmas.org • www.mnmas.org

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