



MINNESOTA ACADEMY OF SCIENCE

—Promoting Excellence in Science Since 1873—

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The mission of the Minnesota Academy of Science is to recognize, promote, and influence excellence in science. Through educational programs and professional development opportunities—from middle school through professional life—the Minnesota Academy of Science supports Minnesota's scientists at every stage of their development, providing a vital forum for scientific inquiry and discussion that reaches thousands of Minnesota scientists annually.

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Minnesota representatives to the Intel International Science & Engineering Fair.

Connect with Us

Keep in touch with all our programs, network with Minnesota Academy of Science members and other program participants, and stay up-to-date on the latest science news and events by connecting with the Minnesota Academy of Science on social media.



Thank You, Volunteers!

By Celia Waldock

One of the biggest reasons we are able to offer the type of quality programming we do at the Academy is because of our wonderful volunteers. The dedication and commitment that our volunteers show to helping students in Minnesota is truly remarkable.

Hundreds of scientists give up their days off or take vacation from work to spend up to 10 hours judging science projects at the Minnesota State Science & Engineering Fair. At the High School and Middle School Science Bowls, scientists read questions, keep score, and organize awards and registration paperwork. Teachers and administrators dedicate substantial amounts of time to helping their students with research and preparation throughout the year. Some teachers not only take personal time off to accompany their students to regional and national competitions, they also pay for their own substitutes. Other volunteers help behind the scenes at multiple events staffing registration tables, hauling boxes, setting up rooms, answering questions at our events, taking tickets, and a host of other duties.



Mike Lohman and Kate Weegman volunteered to staff Display and Safety Set-up the day before MSSEF.

Other volunteers edit the *Journal of Abstracts* for our Winchell Undergraduate Research Symposium. Individuals like Jennifer Bankers-Fulbright sit on and lead planning committees for programs and coordinate other volunteers to create excellent programming.

Our Science Fair volunteers are a committed group who return year and again to help. For the past 15 years, Ed Neu has judged MSSEF, led his employee team of volunteers, and emceed the Grand Awards Ceremony. Volunteers Craig Turner and Deborah Mullen spent four days at the Junior Science and Humanities Symposium and Science Fair this year. Craig spent numerous hours in advance coordinating the evaluation and creation of our new judges' manual and helped Chris Malone create a backup scoring system for papers and projects. Deborah worked copious hours assigning and reassigning judges to projects and developing new judge training sessions. Rachel Robinson and Felicia DeSantos, Co-Chairs of the Scientific Review Committee, spent countless hours prior to implementing new SRC regional processes. Volunteers from regional science fairs like Mike Lohman, Timara Underbakke, Cindy Welsh, Dave Bosma, Dale Weegman, and Ken Mann have dedicated their expertise and time over the years in so many ways I couldn't begin to name them all.



Volunteers staff the Front Office Help Desk.

Some individuals go above and beyond. Wayne Wolsey and Colin Brownlow spend hours and hours reviewing Science Bowl questions in addition to coordinating event logistics and volunteers at their colleges. Matt Thell and Kristine Fowler help with numerous facets of Science Bowl to ensure the program's success.

Thank You, Volunteers! (cont.)

Volunteers from our Board of Directors, such as Gordan MacFarlane, Ned Tabat, Jim Fairman, Karen Newell, and Mike Williams, have spent many hours providing leadership for various projects. Gordon has served on the Board for 16 years (including serving as the President) and also serves as the editor for the online *Journal of the Minnesota Academy of Science* and *Minnesota Academy of Science Journal of Student Research*. Ned has emceed the Grand Awards with Ed Neu for many years, served on the Board, and provided direction for our new Science Salon. Jim has served as President of the Board for six years, during which time he has provided leadership and helped us achieve stability and growth during trying economic times. Karen Newell has served as the Secretary of the Board for many years, bringing her experience as a teacher to the Academy. In addition to publishing our newsletter, Karen has created programs like the Minnesota Scholars of Distinction and the High School STEM Communicator Awards. Mike Williams has judged

at our events for years, has attended National Science Bowl as our representative, staffing that week-long event for the last two years and has now taken on the role of President.

These are but a few examples of all the wonderful people that help make our programming happen. It is impossible to mention all the incredible people that have contributed to making the Academy programs excellent for so many years. I am just hoping to give you a taste of the contribution volunteers make. All of their thousands of hours and thousands of efforts add up to one thing: extraordinary, motivating science experiences for students and scientists in Minnesota.

Thank you, volunteers, for making Minnesota Academy of Science programs outstanding. We couldn't do it without you!

Celia Waldock
Executive Director

Volunteer Door Monitors check name badges outside the Exhibit Hall.



Display and Safety Chair Dale Weegman and volunteer display inspector Kate Weegman.

Message from the Executive Director

By Celia Waldock



Executive Director Celia
Waldock

2012-2013 has been an exciting year of planning and programming for the Minnesota Academy of Science.

We started the year by implementing our new website (www.mnmas.org)

and moved on to transferring data in preparation for a new customer relationship data management system.

While we were planning for our new system, our student participants began practicing for the Science Bowl and planning research projects for the State Science & Engineering Fair, Junior Science & Humanities Symposium, the High School STEM Communicator Awards, and the Winchell Undergraduate Research Symposium.

As soon as Science Bowl Registration began in October, student teams started meeting regularly to study, practice Science Bowl questions, and learn about their teammates to make the best use of each other's strengths.

"As one of my students said, he 'found his people' at the National Science Bowl. For students who are in the top 4% of their class, it's not always easy to find true peers," said Barbara Nelson, the coach of the Mahtomedi Middle School Science Bowl Team. The Mahtomedi team qualified for the National Science Bowl and competed in the Electric Car Competition. "They were so excited when it was announced that they were among the top six design documents. They were jumping up and down and screaming... I kept saying 'I told you so!'"

At the same time that Science Bowl participants were contesting to qualify for nationals, student researchers completed their projects and began competing at the eight regional science fairs across Minnesota. From thousands of students who competed across the state, 500 advanced to the Minnesota State Science & Engineering

Fair in April where they had the opportunity to present their research to professional scientists. Hundreds of awards were presented to students with outstanding projects, including all-expense paid trips to compete at the International Science & Engineering Fair (ISEF).

"The process of conducting a Science Fair project taught me how to reach out to others, or network with people. I learned to accept people's help and use their ideas to further my own," said Karina Skov, who qualified for ISEF along with teammate Ariel Keller. "Being a part of a group of people that all share a passion for science is a feeling like no other," she added. "It is empowering and inspirational to know that you are a part of a group of people that could change the world!"

Other students worked diligently to create high-quality presentations to explain their research papers to panels of professional scientists at the North Central Regional Junior Science & Humanities Symposium (JSHS) held in April. Finalists won the opportunity to compete at the National JSHS and attend the American Junior Academy of Science Annual Meeting held in conjunction with the American Association for the Advancement of Science national meeting. "It was a really good experience," said Heather Stone, who placed third in the poster presentations, where she was given five minutes with each judge to present her research on tef seed. "I learned to break it all down. It was a challenge, but it was good."

Our new High School STEM Communicator Awards were presented at the State Science & Engineering Fair. Students completed their research papers and submitted them to the program in February to be evaluated by professional scientists. Ten students were honored for their exceptional potential in performing and communicating their scientific research. These students received a cash prize, a medal, and the opportunity to publish their papers in the premiere issue of the *Minnesota*

Message from the Executive Director (cont.)

Academy of Science Journal of Student Research (JSR). We are delighted to launch *JSR* this fall as a national online publication recognizing high-quality student research and communication.

Our undergraduate college student participants prepared and registered to present their research at the Winchell Undergraduate Research Symposium held at Augsburg College in Minneapolis. More than 150 people attended the event, which featured poster sessions and formal paper presentations.

Now that our 2012-2013 programs have wrapped up, we are looking ahead to 2013-2014, when we will focus on streamlining our new data system processes including registration, membership, and many more features.

Also in 2013, we will be launching our new program, Science Salon, in conjunction with the American Association for the Advancement of Science (AAAS). At the Science Salon,

professional scientists will be invited to partake in interdisciplinary networking opportunities, stay up-to-date on groundbreaking research and emerging technologies, and attend lectures by Nobel Prize-winning speakers. The first Science Salon will be held August 22, 2013. Check our website at www.mnmas.org/science-salon for more information and join us for this exciting new program to *Stay Current and Stay Connected*.

Lastly, we are sad to say goodbye to James Fairman, who has served as president of our Board of Directors for six years. We would like to welcome Dr. Michael Williams into that role and are excited about the vision he brings to the Board. With the change of leadership, we will continue to strive toward our mission to recognize, promote, and influence excellence in science.

Celia Waldock
Executive Director

Message from the Past President

By Jim Fairman



Past President James Fairman

As I look back over the six years I have served as president, I am proud of the progress we have made at the Minnesota Academy of Science. We have stabilized the organization financially, built effective systems for oversight and positioned the Academy for growth.

We have added new programming: Middle School Science Bowl in 2008, our online *Journal of the Minnesota Academy of Science* in 2012, and the new High School STEM Communicator Award in 2013. And we're not stopping there. In the remainder of 2013 we will premiere a new *Minnesota Academy of Science Journal of Student Research* and our new Science Salon series for professionals in late summer/fall of 2013.

We've improved our services too, offering continuing education workshops for teachers and a Regional Science Fair Director's meeting at the Minnesota State Science & Engineering Fair (MSSEF).

We've expanded the MSSEF to provide more opportunities for students to present their research and receive feedback from professional scientists.

Message from the Past President (cont.)

We celebrated our 75th Anniversary of State Science & Engineering Fair in 2012 and thanks to our generous funders began offering registration fee scholarships for MSSEF and Junior Science & Humanities Symposium to low income families. We are excited about our new updated, user-friendly website with its attractive new look and anticipate that our new data management system capabilities will meet the Academy's needs far into the future.

On a personal note, I have greatly enjoyed the opportunity to emcee the MSSEF Special Awards Ceremony each year, and read about all the phenomenal candidates as the chair of the REAP student selection committee and the Seagate Teacher/Mentor Awards selection committee. It is truly a pleasure to read all the great achievements and testimony in these wonderful applications.

Of course, these are group achievements, and I would like to thank the staff and the Board for making all this happen. As I step down from my role as president, I am pleased to look back on the progress we have made and honored to be part of an organization with such a rich history and promising future in Minnesota.

Jim Fairman
2009-2013 President
Board of Directors

Message from the President

By Michael Williams

The Minnesota Academy of Science is poised to expand its program offerings and become an organization that has greater regional impact on the promotion and advancement of science. Through the diligent efforts of the Executive Director and the Board of Directors, the Academy has emerged from the economic downturn, which had significant negative impact on many nonprofit organizations, with a solid base of donors and an improved financial status. This has enabled the Academy to make strategic investments in i) technology upgrades that will enable us to connect with our members and supporters and ii) a new program initiative that is intended to provide a vehicle to bring together professional scientists and engineers for education and interaction.

As President of the Academy, I want to make sure that we strive for continuous improvement of our existing programs by seeking and responding to feedback from all sources (i.e., participants, volunteers, and staff). In addition, I would like to continue the Academy's strategic emphasis on growing to invest (i.e., building our donor and membership network) and investing to

grow (i.e., continuing our efforts to develop new programming for adult scientists and engineers).

I am excited to be a part of a vibrant organization that encourages participation and excellence in science.

The Minnesota Academy of Science has been in existence for many years. I want to work with the Executive Director and the Board to make sure that we take the steps necessary to keep it a vital part of Minnesota's scientific culture.

Dr. Michael Williams
President
Board of Directors



President Michael Williams

Recap: Minnesota State Science & Engineering Fair

By Lise Weegman

Since 1938, the Minnesota State Science & Engineering Fair (MSSEF) has stood out as the most far-reaching, project-based STEM education program in the state to prepare students for college and the workforce. Many alumni now hold advanced degrees and successful careers in science, technology, engineering, and mathematics and cite MSSEF as one of the highlights of their high school experience.

Nearly 500 students in grades 6-12 displayed their scientific research and technological design projects from April 7-9 in Bloomington at the 76th Annual MSSEF. Professionals from industry, government, and academia judged students on their originality and creativity, use of scientific or technological design methods, clarity of expression, knowledge gained, and teamwork.

Kari Cutting, Vice President of the North Dakota Petroleum Council, delivered the keynote speech on Monday evening. She emphasized the role science plays in reducing dependence on foreign oil by advancing technologies in the oil industry. The following morning, students were treated to a second keynote speech by Don Shelby, retired WCCO news anchor and environmental correspondent. He challenged students to engage scientific thinking to solve local and global environmental problems to ensure clean air and clean water.

Thanks to generous corporate and government sponsors, more than \$25,000 was awarded to outstanding students at MSSEF in 2013. Bruce Lueddecke from Diasorin emceed the Special Awards Ceremony; the Grand Awards were presented by Ed Neu and Heidi Olson from Seagate Technology.

The Minnesota State Science & Engineering Fair is more than a competition. The entire experience allows participants to be introduced to new people and new ideas, involve themselves in workshops and activities, and network with peers. Student and adult participants attended



Ryan Berglund and Adam Welker present their team research project at MSSEF.

workshops ranging from “The Importance of Using Statistics in Scientific Research” to interactive science activities conducted by the 3M Visiting Wizards and Colin Kilbane, the “Mad Scientist of Minnesota.”

During MSSEF, the Regional Science Fair directors, assistants, and representatives from across the state met to discuss news, share problems and solutions, and plan for next year. Representatives and other interested participants also attended a workshop on “Building and Maintaining Support for Regional Science Fairs” to support scientific excellence in every corner of Minnesota.

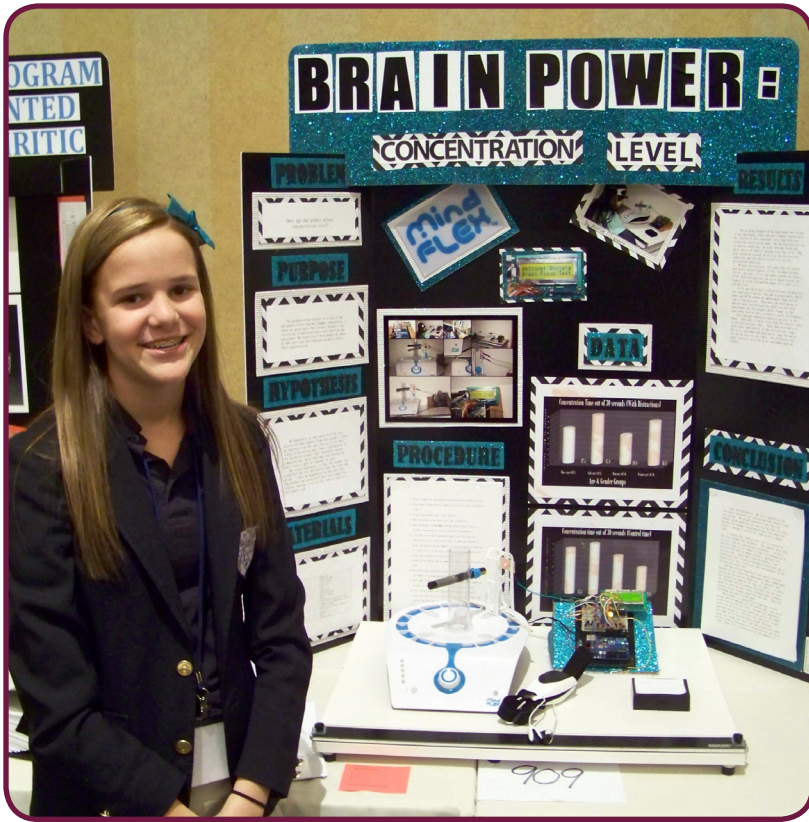
See you at 2014 Minnesota State Science & Engineering Fair, March 29-April 1, Doubletree by Hilton Hotel in Bloomington.



*Lise Weegman
State Science & Engineering
Fair Director*

Photos: Minnesota State Science & Engineering Fair

To see more photos of MSSEF and our other programs, find us on Facebook.



Annie O'Connell from Our Lady of Grace Catholic School displayed her project for judging in the Medicine & Health Sciences category.



Nirupa Galagadera and Abby Erdmann won the Surgeon General's Award at MSSEF.



Don Shelby, the 2013 Grand Awards Keynote Speaker, poses with MSSEF Director Lise Weegman.



Connor Watson, Cooper Klotzbach, and Ater Koth researched the consequences of secondhand smoke.

Top Student Award Winners at MSSEF

Award	Amount	Winner	Project
Intel ISEF Award	All-expense paid trip to ISEF	Priyanka Narayan	Improving the Oral Absorption of Chemotherapeutic Drugs Through the Use of Novel Nanoparticles
Intel ISEF Award	All-expense paid trip to ISEF	Darius Bieganski	A Telemedicine Tool for Monitoring Parkinson's: Using Microsoft Kinect to Engineer the Parkinsonsprototracker
Intel ISEF Award	All-expense paid trip to ISEF	Lisa Fu	Phytochemical and Pharmacological Effects of <i>Taraxacum officinale</i> on Hepatocellular Carcinoma
Intel ISEF Award	All-expense paid trip to ISEF	Abhishek Nayar & Stephen Kim	Birth of a Revolution
I-SWEEEP Award	All-expense paid trip to I-SWEEEP	Robert Kitaoka	Impact Energy Attenuation Performance of Football Headgear in Simulated Helmet to Helmet Collisions
Seagate Rising Star Award	\$2000	Carolyn Jons	A New Innovation in Food Preservation
Seagate Rising Star Award	\$1500	Sarah Betts	An Exercise Therapy Program and Hand Device Invented to Benefit Osteoarthritic Patients
3M Innovation Award	\$1000	Sarah Betts	An Exercise Therapy Program and Hand Device Invented to Benefit Osteoarthritic Patients
3M Innovation Award	\$1000	Jason Sylvestre	Engineering Voltx, a Multifunction Teleoperated Rescue Robot
Medtronic Award	\$1000	Karina Skov & Ariel Keller	Car Seat Sensor Battling Child Neglect
University of Minnesota College of Pharmacy Award	\$1000	Priyanka Narayan	Improving the Oral Absorption of Chemotherapeutic Drugs Through the Use of Novel Nanoparticles
University of Minnesota College of Pharmacy Award	\$1000	Lisa Fu	Phytochemical and Pharmacological Effects of <i>Taraxacum officinale</i> on Hepatocellular Carcinoma
3M Innovation Award	\$750	Bennett Gathje	The Scoop on Poop
3M Innovation Award	\$750	Darius Bieganski	A Telemedicine Tool for Monitoring Parkinson's: Using Microsoft Kinect to Engineer the Parkinsonsprototracker
Medtronic Award	\$750	Holly McGinn	Body Symmetry: What Effect Does Body Symmetry Have on the Perceived Health and Beauty?
Ecolab Food Safety Award	\$700	Hannah Eller	Container or Contaminant
Ecolab Food Safety Award	\$700	Carolyn Jons	A New Innovation in Food Preservation
Ecolab Green Award	\$700	Paige Weymiller	Thermal Pollution = Fishy Heat
Ecolab Green Award	\$700	Rena Weis	Impacts of Biochar on Soil Greenhouse Gas Emissions, Soil Moisture, and Crop PAH Concentration
General Mills Food & Nutrition Award	\$700	Alexandra Rosendahl	Eating Your Way to Lower Blood Glucose Levels
General Mills Food & Nutrition Award	\$700	Tanvi Kohli	An Exploratory Study of Genetic Variation in Fatty Acid Synthase (FASN) Gene with Body Mass Index (BMI) in Caucasian Males
3M Innovation Award	\$500	Ethan Ekblad	Distracted Driving: Could They Stop in Time? the Answer Is in the Math.

Top Student Award Winners at MSSEF

Award	Amount	Winner	Project
3M Innovation Award	\$500	Michael Hirsch & Nathan Lax	The Effects of Solar Flares on Various Types of Electronic Shielding
Institute of Food Technologists - Minnesota Section	\$500	Emily Scinocca	Why Doesn't Birch Bark Rot Quickly?
Institute of Food Technologists - Minnesota Section	\$500	Ellie Ekblad	A Nutrition Education Program's Ability to Affect Children's Immediate Food Selection Choice
Medtronic Award	\$500	Anna Corradi & Elizabeth Corradi	Green Education for Nature
Medtronic Award	\$500	Mercy Rakow	Mendelbaum's Effect Year III: Ocular Accommodation Changes Due to Technology
Pentair Award	\$500	Kate Kleinschmidt	Does Sediment Storm-Water Runoff Affect the Aquatic Organism <i>Daphnia magna</i> ?
Pentair Award	\$500	Samantha Woog	Microbial Nanochemistry: Modifying <i>Shewanella oneidensis</i> MR-1 for Aerobic Water Bioremediation and Bioenergy Production
Institute of Food Technologists - Minnesota Section	\$250	Sam Wehr	Testing Iron Content in Breakfast Cereals
Institute of Food Technologists - Minnesota Section	\$250	Carolyn Jons	A New Innovation in Food Preservation
Penny Lohman Award	\$250	Austin McCoy	Designing and Validating Affordable, High Quality PCR Laboratory Equipment for Developing Nations
Pentair Award	\$250	Maxwell Waite	Water Quality in Lake Orono: Just Run off
Pentair Award	\$250	Lexi Madlom	Is Earth's Best Friend Slimy and Green? Algae Based Carbon Dioxide Sequestration From Simulated Flue Emissions and Nutrient Extraction From Eutrophic River Water
SPIE Optics and Photonics Science Fair Award	\$250	Jared Motschenbacher	Let There Be Light
WSB Engineering Excellence Award	\$250	Bennett Gathje	The Scoop on Poop
MEHA Award for Excellence in Environmental Health Science	\$200	Timothy Renier	The Effects of a Multi-Factor Hand Hygiene Intervention with Motivational Interviewing on Hand Washing Effectiveness, Behavior, Attitudes, and Absences of High School Students
General Mills Food-Based Social Change Award	\$125	Neehar Banerjee	An A-Peeling New Water Filtration Method: Using Ground Orange Peels in the Biosorption of Iron (Fe+3)
General Mills Food-Based Social Change Award	\$125	Ellie Ekblad	A Nutrition Education Program's Ability to Affect Children's Immediate Food Selection Choice
General Mills Food-Based Social Change Award	\$125	Adeel Ahmed	Combating MRSA Phase 2: Synergy
General Mills Food-Based Social Change Award	\$125	Abby Anderson	Black is the New Green - Phase III: Comparing the Effects of Biochar on the Growth of Glycine Max

Music as Inspiration for an Orthopedic Device

By Eliza Grames

"I was diagnosed with rheumatoid arthritis last year," Sarah Betts explained in response to how she got the idea for her 7th grade Science Fair project. Determined to work toward alleviating pain symptoms of her own rheumatoid arthritis and her grandparents' hand osteoarthritis, she began working on a device.



Sarah Betts poses with her display created as part of her award-winning research project.

"My right fingers have always been more painful than my left fingers, and I wondered if this was due to my left fingers exercising while playing the violin," she said, adding that she has been playing the violin since she was three years old. "I decided to test this theory and apply my observations to the elderly who suffer from hand osteoarthritis," she said.

Sarah's observations and testing led to her invention of an orthopedic and rehabilitative hand device based on playing the violin. "I named it ViEx because it is based on the violin and it is an exercise device," she explained. After inventing the device, she tested it to see whether the ViEx improved grip strength, hand function, and joint pain in patients who suffer from hand OA.

"I tested 20 subjects over the age of 65 with hand OA," Sarah explained, "and they exercised with the ViEx as directed in my written exercise program every day for four weeks." Sarah's device was successful; 95% of patients had improved grip strength, 95% percent had improved hand function, and 70% had alleviated joint pain.

With the hand device prototype finalized and her study completed, Sarah took her project to the Science Fair. "Participating in Science Fair is an absolutely amazing experience," she said. Not only did she learn to write an extensive research paper and condense it into a concise

oral presentation, she learned to think on her feet and be prepared for judge questions. The judges were impressed. At the Minnesota State Science & Engineering Fair, she was awarded the Seagate Rising Star Award, 3M Innovation Award, and the Gold Award from the Minnesota Academy of Science, among other awards.

Even though Science Fair is over, Sarah's project is not done. "Since the Minnesota State Science Fair, I have given several presentations to CEOs, physicians, occupational therapists, and other scientists regarding production and marketing of the ViEx," Sarah said. Twin Cities Orthopedics and the University of Minnesota were so impressed with the ViEx that they began using it for patients using the exercise protocol that Sarah designed. "I was also invited by 3M to attend a Recognition Event where I presented my project to over 300 scientists and inventors," she said.

In the hopes of providing additional data and knowledge on hand OA to the medical community, Sarah is currently working to publish her study in a scientific journal. In the future, she plans to pursue a career in neurosurgery or engineering.



Ed Neu and Heidi Olson from Seagate Technology with Seagate Rising Star Award winners Carolyn Jons and Sarah Betts.

Presenting Chemotherapy Research at ISEF

By Priyanka Narayan



Priyanka Narayan with her plaque from the Minnesota Academy of Science.

I feel very fortunate to say that I participated in Intel's ISEF this year. It was definitely one of the most fantastic experiences I have ever had. During the week, I was able to meet with students from Norway, Argentina, China, Pakistan, Saudi Arabia, and many other nations, who all share the same interests in science that I do. I was inspired by the Nobel Laureates who spoke at an event as they each described their life experiences. The competition itself was challenging and rewarding. I had knowledgeable judges who gave insightful critiques to help me further my research.

My research itself focused on improving the oral absorption of chemotherapeutic drugs. Currently, cancer patients spend many hours in the hospital receiving chemotherapy. Part of the reason they spend so much time in the hospital is because most chemotherapeutic agents, like doxorubicin, cannot be delivered orally to patients. They can only be delivered intravenously because Pgp (p-glycoproteins) are in cells in the human gastrointestinal tract and stop the absorption of doxorubicin into

circulation. In my research, I used sodium alginate-AOT nanoparticles to improve the oral absorption of doxorubicin and bypass this effect of Pgp.

Last February, I was interested in joining the Science Mentorship program at school to see if I could take part in scientific research at the University of Minnesota. I was really motivated to work on cancer research because I have seen its negative impacts among my friends and family. While doing a literature review, I learned about nanoparticles and their importance in recent pharmaceutical breakthroughs. I immediately realized I wanted to work in this field and sought out a lab to conduct such research. Eventually, I realized I would like to focus on improving cancer patients' quality of life as they battle the disease, since that alone is extremely difficult. I actually began working on my research in August after months of learning about lab processes and equipment.

Finally, months later, I was able to participate in the Minnesota Regional and State Science Fairs for my first time. Being a first time participant, I had no idea what to expect the day of the fair. Many of the other students had years of experience and knew exactly what to expect. Although the Fair itself was new to me, presenting was not. I am a natural speaker; so both fairs went quite smoothly.

In the long run, I hope that the research that I have done in high school will help me with my further education and career. I have always had a passion for the sciences and seeing if I could better human experience. In fact, I have always believed that the ultimate goal of science should be to better the quality of human life. Most of my research was focused on biochemistry; so I really hope to major in biochemistry or biomedical engineering in college.

Priyanka Narayan

Priyanka Narayan just completed her junior year at Wayzata High School as a Minnesota Scholar of Distinction. As a first-year participant at 2013 MSSEF, she received awards from the American Chemical Society, University of Minnesota College of Pharmacy, Beckman Coulter, Seagate Technology, Wolfram Mathematica, and the Minnesota Academy of Science.

The Value of Science Fair for Students

By Tim Guldan

Science. Science is, and always has been a personal passion of mine, whether I knew it... or not so much at the time. In my “younger” days, I was frequently an offender of asking the questions “Why?” and “What if...” I never could have predicted the impact that my insatiable curiosity would eventually have on my life. My first “real” experience with Science Fair was in the sixth grade. While the topic was less than ground breaking—comparing the transpiration rates of various house plants—the experience and the thrill of seeing results captivated me in such a way that I was excited to try a new project the following year.

Though Science Fair was only a requirement within the junior high levels of the school I attended, my teacher, now good friend, Judy Luker, encouraged me to continue my experience within the fair as an extracurricular activity in my high school years. The aftermath of my decision to follow her advice still resonates in my life to this day.

After attending three ISEF fairs in San Jose, Louisville, and Cleveland, my eyes were opened to the possibilities and opportunities that the Science Fair, and science in general, had and has to offer. My ISEF experience ignited a fire for learning and understanding that became unquenchable.

It was this passion that played a crucial role in my decision to return to my roots and become a science teacher. When I was presented with the opportunity to teach at my alma mater, it was a clear decision. The past three years of teaching science and mentoring students with their projects has generated experiences and memories that cannot be described in words. Seeing the passion of learning instilled within their minds, the excitement of discovery makes every moment of preparation worth the while.

For better or worse, when many students hear the words “science,” and “fair” next to each other and in the same sentence, they try to run for the hills. As a teacher, it’s my responsibility to the students to break down this wall, and to show them that no matter what their interests are, the Science Fair experience can be a part of and incorporated with their passions. No matter what a student’s interests may be, the questions of “How?” “Why?” and the ever important “Who really cares?” play a daily role. Once a student realizes that problem solving moves beyond the classroom into their hobbies, pastimes, sports, and work experience, they are able to see what the Science Fair experience really has to offer.



Chaitanya Chittineni and Christopher Spencer explain their MSSEF project.

It’s incredible to see the look on students’ faces when they exclaim their idea for a Science Fair project on a topic that they are “actually” interested in.

When a student’s peers see the passion of learning aflame, the blaze catches and spreads. All of a sudden, there are science projects with topics from Zoology to mnemonics, from written languages to math equations, and from anatomy to physics theory. This goes to show that the Science Fair can reach far beyond the confines of a single classroom discipline, but stretch and unite so many diversified areas of study into one place. It is simply incredible.

At the beginning of each school year, many of my students quickly catch onto the fact that I tend to “geek out” about the Science Fair. This is quickly followed by a Q & A session about why I get so excited. I try to explain to them the value of the experiences they will have, all of them beneficial. The Science Fair provides such a service to students that many may not even realize. Speaking with judges becomes practicing for a job interview. Reading comments relates to feedback from a supervisor in the workforce. Presenting original work prepares for public speaking and critiquing.

The Value of Science Fair for Students (cont.)

The Science Fair creates an environment for students that is unique all to its own. With multiple levels of competition, there is always a sense of encouragement for growth and self-improvement. A teacher can rant and rave about the advantages of their field, but real value can be placed when the students begin to share that belief. For me personally, nothing is quite as satisfying as hearing a student, who had previously dreaded the Science Fair, exclaim, "I can't wait till next year!"

Tim Guldán
Science Fair Mentor and Teacher



Ed Neu and Heidi Olson flank Seagate Science Mentor Award winners Stephen Moe (blue) and Tim Guldán (peach).

Tim Guldán teaches 7th and 8th grade science at Cathedral High School. He is a recipient of the 2013 Seagate Science Mentor Award for his creative teaching methods and "love for Science Fair." Over the past three years, he has brought more than 71 student projects to the South-Central South-West Regional Science Fair, 47 of which have advanced to MSSEF.

Recap: Junior Science & Humanities Symposium

By Lise Weegman

In 1968, the Minnesota Academy of Science sponsored the first Tri-State Junior Science & Humanities Symposium (JSHS), in conjunction with the US Army, for students in Minnesota, North Dakota, and South Dakota. At the North Central Regional JSHS (as it is now known), students compete for scholarships and the opportunity to present at the National JSHS competition sponsored by the Department of Defense and hosted by the Academy of Applied Science.

From April 6-7, more than 80 students from 31 schools across the tri-state area convened in Bloomington for the 45th Annual North Central Regional JSHS. Students presented a total of 72 scientific research papers in front of panels of expert judges representing government, industry, academia, and professional fields.

After a full day of oral presentations, students, judges, parents, and research mentors relaxed to jazz music performed by the Reid Kennedy Trio during dinner. Following the dinner, students welcomed the keynote speaker, Commissioner John Linc Stine from the Minnesota Pollution Control Agency (MPCA).



Caleb Kumar presents at JSHS on developing an iPhone app that helps with post-stroke rehabilitation.

Junior Science & Humanities Symposium (cont.)

Commissioner Stine discussed the challenges the MPCA faces in keeping citizens safe in a healthy environment while still growing the economy. He emphasized the importance of science to the work the MPCA does and the need for future scientists to protect Minnesota's land, water, and air.

The North Central Regional JSHS wrapped up on Sunday, April 7th with the awards ceremony. The top 3 papers received an all-expense paid trip from the Academy of Applied Science to advance and compete in the National JSHS in Dayton, Ohio from May 1-5. The top papers were:

- Connor Klemenhagen (Champlin Park Senior High School)
The Ecological Development of Turfgrass Mixtures to Reduce Irrigated Water Consumption
- Ariel Keller and Karina Skov (Alden-Conger High School)
Car Seat Sensor Battling Child Neglect
- Heather Stone (Mounds View High School)
Invention of a Tef Seeder and Conduction of Field Trials

For her research on Improving the Oral Absorption of Chemotherapeutic Drugs Through the Use of Novel Nanoparticles Priyanka Narayan (Wayzata High School) was awarded the American Junior Academy of Science (AJAS) plaque and an all-expense paid trip to attend the AJAS/AAAS Annual Meeting in Chicago, Illinois from February 13-17, 2014. Aditi Das (Roseville Area High School) and Jenny Lai (Wayzata High School) joined the top three paper presenters and also attended the National JSHS to present their research projects to peers.

At the National JSHS competition, Connor Klemenhagen took First Place in Environmental Sciences and was awarded a \$12,000 scholarship.

Thanks to all our sponsors, judges, and volunteers who worked enthusiastically to make the 2013 North Central Regional JSHS a success.

Lise Weegman
JSHS Director

During "Breakfast with the Scientists" on Sunday, April 7, students had the opportunity to speak with professional scientists and discuss their projects informally. Thanks to the following scientists who volunteered their time and experience during the breakfast:

Leslie Brandt, Ph.D.
U.S. Forest Service
Northern Research Station and
Eastern Region

Jerome Cossette, Ph.D.
Senior Development Scientist
Beckman-Coulter

Daniel A. Harki, Ph.D.
Assistant Professor
Department of Medicinal Chemistry
University of Minnesota

Michael W. Hult, P.E.
Environmental Engineering Specialist
3M Environmental, Health, and Safety
Operations

Deborah Mullen, Ph.D.
Research Scientist
Park Nicollet Clinics

Gregory Parks, Ph.D.
Department of Global Pediatrics
University of Minnesota

Rachel Robinson
Industrial Hygienist
OSHA, St. Paul Office

Hedie M. Teoh, Ph.D.
Principal Scientist
General Mills Inc.

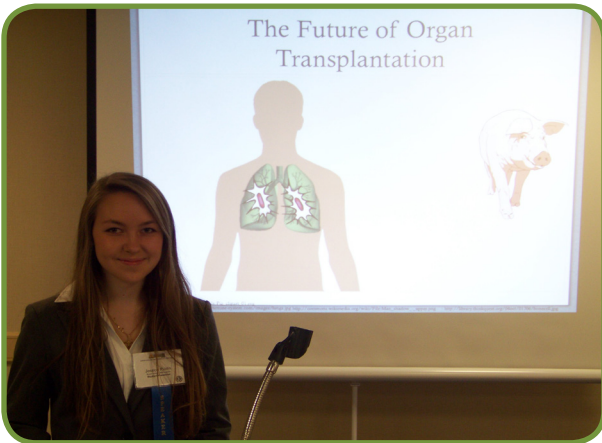
Shiela Ugargol Keefe, M.S.
Senior Toxicologist
Barr Engineering

Photos: Junior Science & Humanities Symposium

To see more photos of JSHS and our other programs, find us on Facebook.



Connor Klemenhausen accepts his first place award in the Environmental Sciences category at the National JSHS competition.



Jessica Ryvlin of Breck School presents at JSHS.



Deborah Mullen, a Research Scientist at Park Nicollet Health Services discusses science career options with students at the JSHS dinner.



JSHS student winners, parents, and mentors pose with JSHS Director Lise Weegman and Executive Director Celia Waldock.

Inventing a Tef Seeder to Aid Developing Nations

By Eliza Grames

Like all good science, Heather Stone's research began with hard work and curiosity. As a volunteer with Compatible Technology International (CTI), Heather worked on the Lost Crops of Africa project weeding crops planted at the University of Minnesota.

"I had to stop weeding the tef because I couldn't get between the rows anymore," Heather explained. "I wondered 'How do they do this in the country where it is produced?'"

Tef is the staple crop of Ethiopia, but Heather found that there are currently no technologies available to farmers, which makes cultivating the miniscule seeds difficult. Each pound of tef contains more than 1.3 million seeds, so farmers hand-broadcast the seeds.

"There are a ton of weeding and harvesting difficulties," Heather explained about the hand-broadcasting method. "That's where I came up with the idea to plant the crop in rows." Planting tef in rows allows farmers to go between the rows and hoe to minimize the amount of weeds in the final harvest.

The tef seeder that Heather developed is made entirely out of materials available to farmers in developing countries: wood, screws, plastic bottles, aluminum, and duct tape. Her device furrows four rows at a time, plants the tef seeds neatly, and covers the seeds up again all in one motion.

Before creating her seeder, Heather developed a method to test inexpensive commercial seeders on efficiency, accuracy, seed flow rate, and cost.

"Then I invented my own seeder and tested my seeder in the same test," she said. She also tested her seeder against the hand-broadcasting method. Her seeder outperformed all of the commercially available seeders that she tested and hand-broadcasting, which piqued the interest of the CTI Board and professors in Ethiopia.

With both years of research combined, she prepared her project to present at the Junior Science & Humanities Symposium (JSHS). Heather placed third at competition and qualified

to compete at National JSHS. "It was a really good experience," she said. "It was a challenge, but it was good."

Currently, Heather has a research internship in the Department of Food Science & Nutrition at the University of Minnesota, where she plans to attend college after she graduates from Mounds View High School in 2014. "I'll be testing how to make bread using a wheatgrass flour," she said. "It's really cool because it's a perennial,

so you don't have to reseed. It's a good rotator crop too."

"I think I'll probably have this project with me my whole entire life and hopefully get it to spread," she replied in response to asking if she planned to continue her tef research. The goal of her research is to share her technology with developing countries that are in need of nutritional staple foods. "I think the most exciting part is that small scale farmers in third world countries will be thought about," she said, hopeful that her research "will possibly bring more innovation and experimentation to the field."



Heather Stone tests her tef seeder in trials at the University of Minnesota.

Winning National JSHS After Four Years of Research

By Connor Klemenhausen

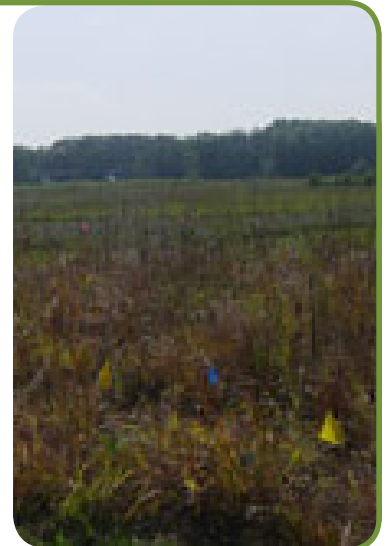
Four years ago I started a Science Fair project, and since then it has become so much more than a project. It's become a part of my life.

The inspiration for my research came during a 7th grade field trip to the University of Minnesota Cedar Creek Ecosystem Science Reserve. While most of my classmates were taking the experience for face value (a walk through the prairie), I was paying careful attention to simple Darwin experiments that proved how more species in an ecosystem was not only more productive than a monoculture, but also resisted invasive species and required less nutrients and water. I immediately linked these prairie grasses with the grass found on our home lawns, and wanted to know if the same principles applied. That inquiry began phase one of my project; literally mixing different species and cultivars of turfgrass seeds to see if they performed better than the single species trials. That project earned me a trip to the Minnesota State Science and Engineering Fair, and while I gained minimal praise, it was enough to keep me interested.

A year later after reaching the effective limit to the seed mixing project, I sought help from the institution where my passion had begun. I met with Ms. Mary Spivey, the educational coordinator for Cedar Creek, and she was supportive far beyond what I deserved. She connected me with a graduate student at the University of Minnesota named Josh Friell, a mechanical engineer turned horticulturist who had just received a grant from the MN Department of Transportation to develop road salt tolerant turfgrass. The state was tired of replanting grass on the sides of highways every spring, and Josh had the solution. He knew that there were already species of grass called alkali grasses that were very resistant to high salinity environments; however, they had a range of other weaknesses. His solution was to create a mixture of turfgrass species, one which was salt tolerant but could also remain green in the event of the alkali grass' weakness. He was intrigued by the ecology of turfgrass, which was the entire topic of my project. And by then, my goal had progressed to the ecological concerns of home lawns, primarily water use.

From my research I had known of drought resistant turfgrass species, but most were visually undesirable for the average consumer. So the solution, again, was combining drought tolerant grasses with aesthetically pleasing ones to create a more drought tolerant mixture. And the means of accomplishing this, I learned, was by use of ecological modeling, to determine the individual contributions of turfgrass species to a given factor (salt resistance or drought tolerance), and even see the positive or negative interactions between species in a mixture.

In 1940, the Minnesota Academy of Science was instrumental in establishing The Cedar Creek Natural History Area (CCNHA) through the initial purchase of a tract of 500 acres of land. The Academy transferred the title of the land to the University of Minnesota as a gift. When further funds became available to the Minnesota Academy of Science and the University of Minnesota from the Fleischmann Foundation, further land was acquired and a laboratory was constructed on site. Through agreements with the Minnesota Academy of Science, the University of Minnesota maintains the CCNHA under the administration of the Graduate School Dean, who appoints a Director and an Associate Director. The University agreed to keep and preserve the CCNHA lands in their natural condition and administer the area to encourage its wise use for scientific and educational purposes.

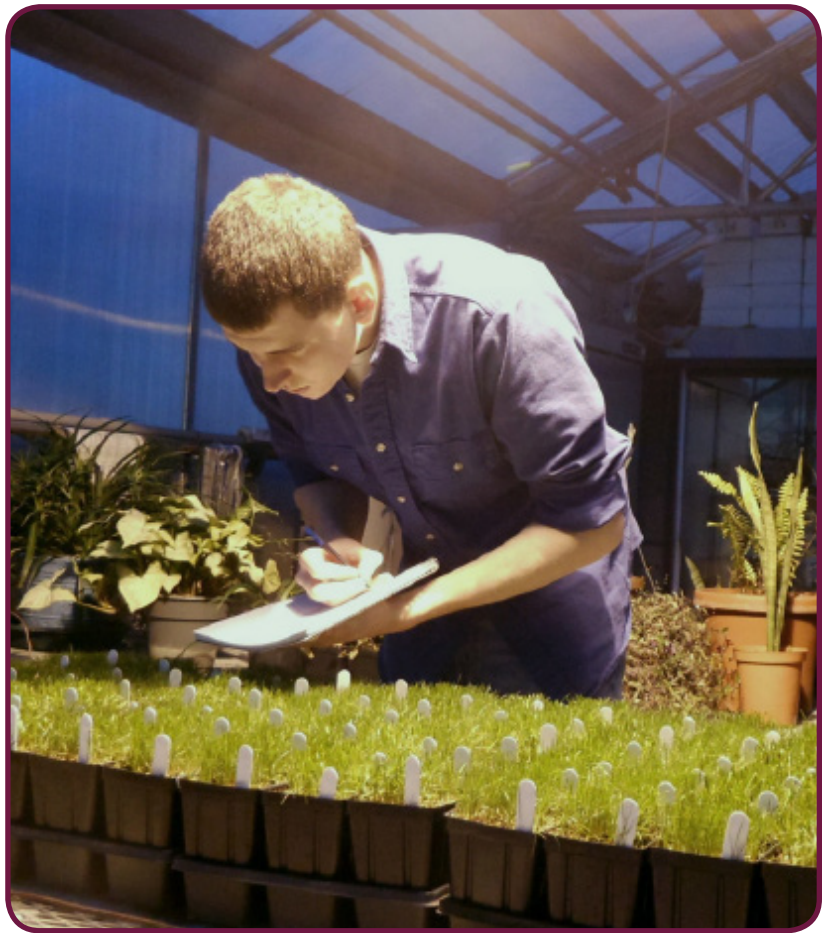


Winning National JSHS (cont.)

It was this phase of my project that really narrowed my focus, and made me eager to learn. I dedicated months to the modeling, which was a very time consuming and complex task, but Josh was the perfect teacher, and the results were amazing. I had found drought tolerant mixtures that shattered conventional wisdom about turfgrass and far exceeded the standards set by the industry. I couldn't have been more excited to present at the Regional Science Fair my junior year. Unfortunately, my judges weren't nearly as excited. In fact, they were bored. The dense and statistically intense project, regardless of its impacts lacked the appeal needed to attract judges, and I left both regionals and state with no acclaim.

The following year, I seriously contemplated not continuing my project. It had taken immeasurable amounts of time away from my school work and other extracurricular pursuits, and although it had yielded me significant knowledge, I had very little to show for my efforts. Furthermore, the professor of the turfgrass science at the University of Minnesota went on sabbatical, leaving Josh to teach his classes and continue the department's research, and leaving me without an advisor. So, as a last resort, I went back to Ms. Spivey for guidance. And, as fate would have it, she provided such guidance.

She informed me that the extension coordinator for the university had recently retired, and a Ph.D. candidate named Sam Bauer had filled the position. Sam had his degree in turfgrass science, and was an expert in public relations for home lawns. He even had a field office in Andover, MN, much closer to my school and home than the St. Paul campus where I had done my experiment the previous year. And by the conclusion of my first meeting with Sam, the love for my project had been renewed. We discussed my results from the previous phase, agreed on freshwater conservation as an incredibly critical topic, and decided that reducing the amount of water used by lawns was a necessary challenge.



Connor Klemenhausen collects data on his turfgrass mixtures.

Using the information from my ecological modeling, I was able to select specific proportions of each turfgrass species in order to create a set of optimized drought tolerant mixtures. The goal was then to test these mixtures in comparison to common mixtures, the ones consumers had access to at home improvement stores and on sod farms. Using methods I had developed in the previous phase, I could measure the differences in turf quality (green) during a drought, and then quantify that comparison in terms of the amount of water saved. I was confident that this project, my senior year, would finally have the appeal that I so desperately needed to qualify for national and international science fairs. Luckily, this time I was correct.

Winning National JSHS (cont.)

The pinnacle of my Science Fair career came during the Junior Science and Humanities Symposium (JSHS), a competition sponsored by the Department of Defense. At the State Science Fair (which was the regional qualifying level for JSHS), I was surprised to win first place, a \$2,000 scholarship, and advance to the national competition in Dayton, Ohio. There, I was further astounded after winning first place



First place winners at the National JSHS competition in Dayton, Ohio.

in the nation for my category of Environmental Science. That honor came with a \$12,000 scholarship, and when I stepped on stage during awards that night, I distinctly remember yelling to the crowd, "I'm going to college!" Because it was true. I come from a family of very modest means, and they won't be able to contribute to my education. I've worked hard to earn other scholarships, but had it not been for that national JSHS scholarship, my plans to attend the University of Minnesota this fall would be in serious jeopardy.

My Science Fair project has also benefited my college plans in an additional way; by helping me develop a path for exactly what I want to do with my life. I've taken many classes during high school for college credit, but my scientific research is what most literally translated to me choosing a major to study. This is a significant advantage compared to the average student who now takes more than four years to graduate college, and it could potentially save me even more money during my time in college. With the majority of my liberal education requirements fulfilled, and my refined vision due to Science Fair, I'm on track to graduate in less than three years, and those years will be much more affordable thanks to scholarships from JSHS and other organizations who were impressed by my scientific accomplishments.

Finally, looking to and past college, I know that Science Fair will continue to benefit my professional opportunities in the world because of my experience with graduate level research. Once at the University of Minnesota, I can immediately take advantage of the Undergraduate Research Opportunities Program, which requires little more than a proposal (much like my Science Fair research plans) for me to earn a grant and do my research. From there, I can hopefully begin working on graduate research of my own. Having a good deal of experience to show for myself, I will also search for internships in my field, and that could lead to a career. The options are truly endless because of Science Fair.

Winning National JSHS (cont.)

But now that I'm done with Science Fair, I feel the need to advocate for youth science education because of how much it's influenced my life. My years of doing a science project were witness to the disturbing reality that funding for this type of education is in constant peril, especially in my own school district (the largest district in the state), Anoka-Hennepin ISD #11. School officials don't recognize the value of these independent research programs for students, and that's a shame because by doing so they are literally ignoring the impact it has had on so many students like myself. Scholarships, professional connections, public speaking skills, presentation crafting, and even practice emailing- I can attribute all to my Science Fair experience.

I would also argue that students need more guidance than simply being encouraged to pursue careers in math and science. Many students take college classes in high school, get top grades, and still have no idea what they want to do with their life. They assume something in a STEM field, because they hear that's where the money is, but few actually understand the work and level of creativity that it will take to get them there. Science Fair exists to teach students for that exact purpose; to get them excited about a certain field of study so that they want to learn more about it and will use novel means to do so. That's exactly what happened to me. Had it not been for that field trip to Cedar Creek in 7th grade, there's a serious chance that I would have never posed the question which began my project. And had it not been for my 9th grade science class and District Science Fair, both which continue to be vehemently fought for by my teacher and mentor Mr. Kevin Molohon, I never would have had the means to showcase my research and the desire to further it.



Connor Klemenhagen poses with his North Central Regional JSHS trophy.

Science Fair should be an integral part of every science curriculum, and I wish that more of the people in charge would realize that. My experiences, my high school's reputation with Science Fair, the students that my region sends to the international fair every year, the Minnesota State Science and Engineering Fair, the national JSHS, or any of the projects and friends that I've had the privilege of competing along side during my Science Fair career – they can all serve as examples of the intrinsic value that I believe Science Fair gives to everyone involved. I am forever grateful for the opportunities that Science Fair has offered me, and I hope that students will continue to learn from it for years to come.

Connor Klemenhagen

Connor Klemenhagen graduated from Champlin Park Senior High School in 2013. After winning the North Central Regional JSHS, he competed at Nationals and took home the Grand Award for Environmental Science. At the 2013 MSSEF, he won the Mathematica Software Award and a Gold Award from the Minnesota Academy of Science. In the fall, he will be attending the University of Minnesota where he plans to study Environmental Sciences, Policy, and Management.

Recap: High School STEM Communicator Awards

By Karen Newell

In recent years, the gap in understanding between scientists and the public has become evident in highly polarized controversies such as climate change, stem cell research, and animal experimentation. There is a sense in our society that increasing the quality of discourse on these issues requires more than just increasing science skills among the general public; we must improve communication skills within the scientific community.

For 75 years, the Minnesota Academy of Science has managed the state level of competition for science, technology, engineering and math through the State Science & Engineering Fair. The State Science & Engineering Fair continues to provide opportunities that enable middle and high school students to showcase and present their scientific research findings to experts in their fields while continuing to nurture and develop their understanding of science. As part of the State Science & Engineering Fair, students also have the opportunity to present their written scientific research in the form of oral presentations through the Junior Science and Humanities Symposium.

MAS has created an additional program focused on written communication skills among young scientists, technologists, engineers, and mathematicians. Through the generous funding of St. Jude Medical Foundation, the Minnesota Academy of Science launched the Minnesota High School STEM Communicator Awards. The goal of these awards is to identify and encourage high school students who show exceptional potential in performing scientific and mathematical research, in communicating their research through writing, and in understanding the societal context of their research and results.

Applicants for the STEM Communicator award completed an investigative research project that explored a current issue relating to science, mathematics, technology, and society (library research projects were not accepted). The authors are Minnesota students who have taken

three years of science, including class work in biology or environmental science, chemistry, and at least concurrent enrollment in physics (science portion of Award); and have taken three years of math at an advanced level of coursework for their grade (mathematics portion of Award).

Each of the entries was read by three categories of evaluators: a working scientist in the field of the student's paper, a citizen-scientist (a person who enjoys science but may not work in the student's field), and a math or science teacher. In addition, two professional technical writers read all submitted work.

Thirty-four student papers were evaluated, and the top eight papers are to be published in the *Minnesota Academy of Science Journal of Student Research*. Cash awards and medals were also given to the top writers at the MSSEF Grand Awards Program in April.

The top papers to be published:

- Abby Erdmann, Breck
- Redeat Abegaz, Burnsville High School
- Greer Bingham, Breck
- Elliott Weiler Breck
- Paige Dempsey, Breck
- Kira Hinz, Breck
- Priyanka Narayan, Wayzata High School
- Sarah Davidson, Burnsville High School
- Emily Wollmuth, Burnsville High School
- Suraj Shah, Burnsville High School
- Claire Simpson, Breck



Winners of the 2013 High School STEM Communicator Awards.

Recap: Winchell Undergraduate Research Symposium

By Megan Buchanan

The 80th Annual Meeting & 25th Winchell Undergraduate Research Symposium was hosted on April 13, 2013 at Augsburg College in Minneapolis. This year's event boasted 130 participants, showcasing 80 student presenters from 19 institutions, including three community colleges and several out-state colleges, such as the University of Minnesota – Duluth, Concordia College, and Minnesota State University – Moorhead. We were excited to have over 25 judges to review the high-quality presentations and provide feedback to the student researchers.

We were honored to have Dr. Kristi Curry-Rogers, an expert on vertebrate paleobiology and dinosaur evolution, as our keynote speaker. Dr. Curry-Rogers is a professor of Geology and Biology at Macalester College and the former curator of paleontology at the Science Museum of Minnesota.



Panelists representing graduate programs and industry careers offer advice to undergraduate students.

Following the student presentations, participants attended panel discussions that sparked full, lively discussion. One of the panels was led by graduate students from a variety of disciplines and industry professionals from local, innovative companies like Medtronic who shared their knowledge of STEM employment. With the healthcare industry poised to grow significantly over the next 10 years, we were excited to include a health careers panel for our participants. This panel included medical and veterinary students from the University of Minnesota and other medical schools from around the Twin Cities. The panel discussions were a perfect opportunity for students to learn more about potential career interests and interact with professionals in the field.

Thanks to the sponsors of the 2013 Annual Meeting & Winchell Undergraduate Research Symposium: Augsburg College, Bethel University, Carleton College Biology Department, Gustavus Adolphus College, Hamline University, Macalester College, Minnesota Section of the American Chemical Society, St. Catherine University, St. Olaf College, the University of Minnesota, and the University of Minnesota Chemistry Department (in memory of Dwight C. Legler).



Annual Meeting Coordinator Megan Buchanan and Executive Director Celia Waldock staff the check-in table.

A very special thank you to our 2013 planning committee and Augsburg College! The planning committee is comprised of several science professors from colleges throughout the state and was chaired by Jennifer Bankers-Fulbright from Augsburg College. This group of committed volunteers worked tirelessly to ensure the success of the event. In 2013 these individuals rose above and beyond, executing details and plans to create an amazing event for all involved. We could not do it without these wonderful volunteers!

*Megan Buchanan
Annual Meeting Coordinator*

Notes from Student Presenters and Faculty

The Annual Meeting/Winchell Undergraduate Research Symposium offers an opportunity for presenting students to interact with faculty members of other institutions and to receive excellent and supportive feedback from them and other students. Presenting at the event, students are able to gauge the quality of their work against their peers, giving them the assurance that they are doing quality projects and building their confidence. They are given the opportunity to present and defend their work – a wonderful experience for most. Because of these experiences, the Annual Meeting/Winchell Undergraduate Research Symposium further prepares students for post-collegiate work.

Paul Melchior
Faculty Advisor
North Hennepin Community College & MN State University, Moorhead

I have had the privilege of presenting in the past two years at the Winchell Undergraduate Research Symposium. The entire experience was positive and empowering because I knew that every faculty member there truly wanted to see me succeed. The questions and comments I received always came from a desire to see quality research conducted in the state of Minnesota. I feel confident that I can deliver a talk or present a poster after having prepared twice for the symposium. I would recommend this experience for any undergraduate conducting research in the sciences.

Michael McClellan
Student Presenter
Carleton College

Attendance as a Poster-Session Presenter for the Annual Meeting/Winchell Undergraduate Research Symposium was enriching in several ways. Participating helped reinforce my belief that I really enjoy this science stuff. Additionally, it gave me direction and incentive to continue my education and career goals in plant breeding and genetics. The actual research and preparation for the Symposium was invaluable. The hands-on experience taught me the essential elements of the scientific process. We learned problem-solving skills, experienced that research may not always go as planned, and that patience is truly a virtue. It was wonderful to see the results of your work! The Symposium gave me the opportunity to network with individuals in the scientific community. It was especially beneficial to meet several people from the University of Minnesota, since I will be a student there in fall of 2013.

Myra McCulloch
Student Presenter
North Hennepin Community College

Photos: Winchell Undergraduate Research Symposium

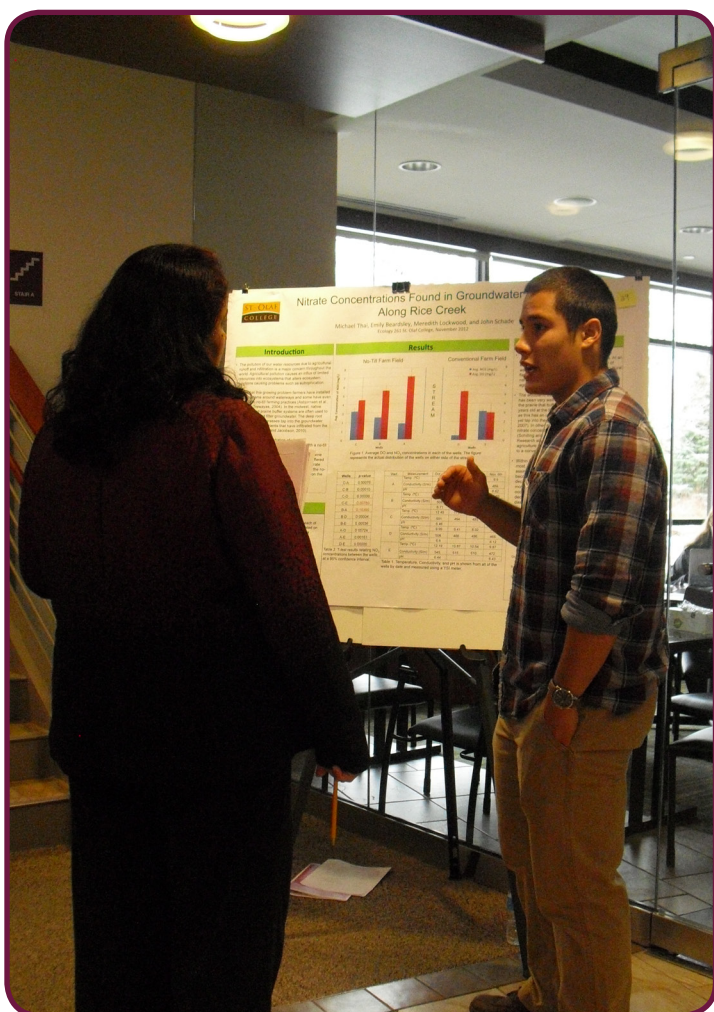
To see more photos of the Winchell Undergraduate Research Symposium and our other programs, find us on Facebook.



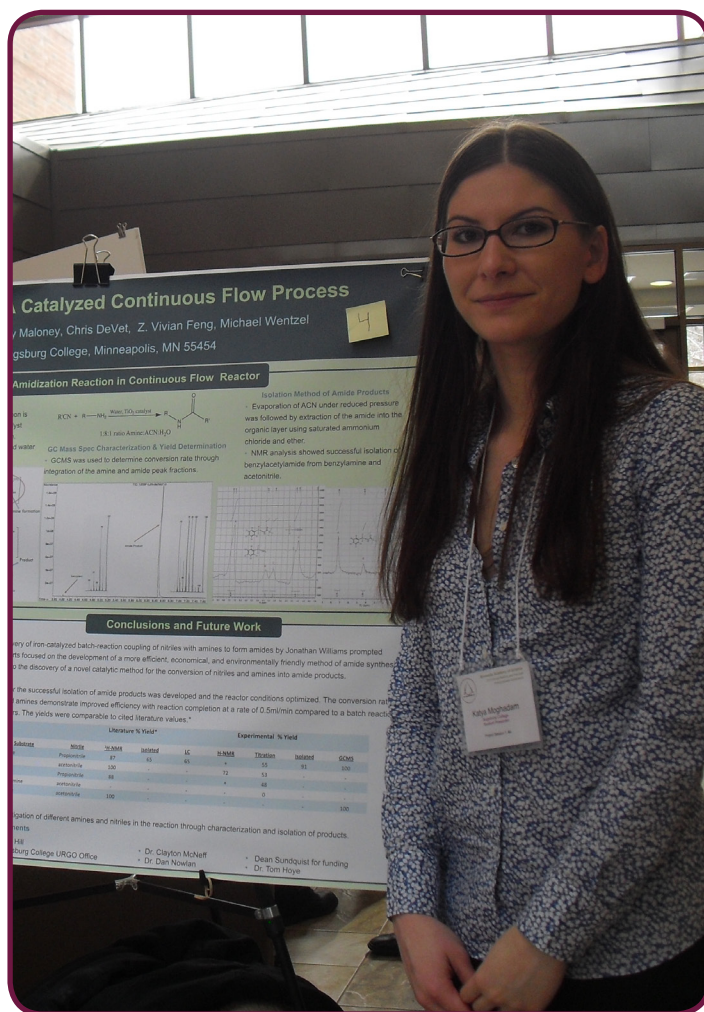
Derek Schmidt presents his research on the Role of Environment and Competition on Ammophila Invasion of West Coast Dunes.



Andrew Kaul from St. Olaf College presents part of a group research project on soil productivity.



Michael Thai presents Nitrate Concentrations Found in Groundwater Along Rice Creek.



Katya Moghadan poses with her poster on her research conducted in the Chemistry Department at Augsburg College.

Recap: MS and HS Science Bowls

By Barbara Donoho

Science Bowl is an academic competition that tests high school and middle school students' knowledge in all areas of science and math. Students are quizzed in a fast-paced question-and-answer format. The Minnesota Academy of Science held its 19th Annual Minnesota State Regional Science Bowl for High School students on January 25, 2013 at Macalester College. The 6th annual Minnesota State Regional Science Bowl for Middle School Students was held February 23, 2013 at the University of St. Thomas-School of Engineering. Between the two events, 56 teams consisting of 276 students and 26 coaches participated.

Teams spent months preparing for this regional competition, meeting frequently, studying, practicing (those buzzers can be intimidating for anyone!), and getting ready for THE BIG DAY! Alas, only one team from each competition could be awarded the prize of an all-expense-paid trip to Washington D.C. to participate in the 23rd annual National Science Bowl Finals – the nation's largest science competition.

St. Paul Central High School won the Minnesota Regional High School competition and went on to compete with 69 other regional high schools in the round robin tournament at the National Science Bowl. They did not qualify to progress to the double elimination tournament. The national winning team was Mira Loma High School from Sacramento, California.



Two teams face off in one round of the Middle School Science Bowl competition.

Mahtomedi Middle School qualified to compete with 46 other regional middle schools in the national academic competition. The students were thrilled to have won some of their round robin rounds but did not go on to the double elimination tournament. The National winning team was Creekside Middle School from Carmel, Indiana.

Mahtomedi also chose to participate in the Electric Car Challenge at the National Science Bowl. The Electric Car Challenge, a featured event at the National Science Bowl, invites middle school students to design, build, and race model cars, competing for cash prizes for their school's science department. Students build their cars from everyday household materials. "It was a fun and exciting day at Chevy Chase High School, cheering on the fastest cars and shouting to urge on those with barely enough power to cross the finish line," noted the Mahtomedi team's coach, Barbara Nelson.



The winning team from St. Paul Central High School.

On Saturday night, the top six teams presented their design documents. The Mahtomedi Middle School Team created a 'dynamic design document' and was awarded 4th place in the design document category. "Our team did a fine job of standing on stage in the auditorium and, using a powerpoint presentation they put together, explained how they made their car and learned about electric vehicles to an audience of over 400 people," said coach Barbara Nelson. The school will be awarded \$250 to be used for

MS and HS Science Bowls (cont.)

science supplies. The team hopes the money can be used for 2014 Science Bowl expenses.

More than 100 volunteers from local educational institutions and scientific companies staffed the two regional competitions. Volunteers are scientists, serving as proofreaders, moderators, scorekeepers, timekeepers, scientific judges, and room runners. Many volunteers dedicated two full days within a month's time to ensure these events would provide an excellent experience for students. These volunteers actively demonstrate their commitment to providing opportunities for

youth to enhance their interest in science, and develop leadership skills. The enthusiasm and dedication these volunteers provide brings continuity to the Minnesota State Regional Science Bowl program and ensures that it will continue to be a viable program for the next generation of upcoming scientists.

*Barbara Donoho
Science Bowl Program Director*

Gaining More than Just Knowledge

By Aidan Flick

Science Bowl gave me a lot more than just knowledge of science. Sure, I learned about lysosomes, paper chromatography, the Jurassic Period, light bulb filaments, the life cycle of the Great Horned Owl, and a whole host of other things, but Science Bowl meant more than that. Science Bowl taught me to, as our coach put it, "BUZZ IN!" It gave me the courage to speak and be heard. It also gave me friends: I met many new people just in our school. I thought I was pretty useless on our team when we started out. I hardly ever buzzed in, and I lacked self-confidence. Once we began practicing, I was encouraged to buzz in more.

But my real confidence booster came after we won Regionals. We began work on our car, and I found that I was helpful with the design document. Where other people can calculate and memorize information, I can write. So I used the skills I had and created a dynamite design document!

*Aidan Flick
Middle School Science Bowl Participant
Mahtomedi Middle School*



Mahtomedi Middle School Science Bowl Team with their coach Barbara Nelson.

Coaching Middle School Science Bowl Teams

By Barbara Nelson

We started meeting in October to prepare for the 2013 Science Bowl. It was very exciting for me as a parent to see nearly 20 kids willing to meet for an hour after school each week to work toward Science Bowl. When we came up with something in the practice questions that was foreign to them, we'd work together to figure out the answer. If there was something complicated, I'd bring additional information the following week to explain the topic. On February 23, we were ready to compete.

As the overall coach of the Mahtomedi Middle School (MMS) Science Bowl teams, I was very proud of all three teams. Each of them progressed to the double elimination tournament. It was a great source of pride for me to see my son's team go undefeated in the Regional Science Bowl. They worked very hard and were prepared for the competition. Yet, they were astounded as it became clear that they were going to win Regionals. We were really excited to go on to DC for the National competition. The kids had no idea what to expect, and neither did I.

I went from being a parent who was simply looking for challenging extra-curricular activities for my children, to a volunteer. I have now enabled three dozen kids in the past three years to participate in Science Bowl, and since my daughter is now determined to go to Nationals, I'll continue my volunteer activities at MMS for the next two years.

I know that teachers are stretched to their limits, but I also know that parents can help coach teams to enable participation in academic competitions. Next year I'm going to incorporate a car design module into our Community Ed Science Bowl club so that all the kids can learn about electric vehicles and the design challenges facing car companies. We'll have a car race of our own so that at least one of our teams is ready for Nationals next April!

I appreciate that there is such an academic competition for our students to participate in, and that there are so many academic and corporate volunteers willing to make it happen each year. So, thank you very much for continuing to make the Science Bowl of Minnesota a viable event for Middle Schools.

Barbara Nelson

Mahtomedi Middle School Science Bowl Coach (and Parent)



The Mahtomedi Middle School Science Bowl Team poses outside their school.

New Staff

We are pleased to welcome new staff and their talents to the Minnesota Academy of Science!

Barbara Donoho joined the staff of the Minnesota Academy of Science in the fall of 2012 as the Program Director for Science Bowl. Barbara is tasked with managing and directing both the Middle School and High School Science Bowls and working with professional scientific societies in Minnesota and the American Association for the Advancement of Science (AAAS) to launch our new Science Salon. Barbara has an extensive background in managing non-profit programs and specializes in event planning and working with volunteers to implement programs.



Eliza Grames was hired on as a Communications Specialist for the Minnesota Academy of Science in March 2013. She will be coordinating communication efforts across programs, managing newsletter content and social media, and providing support to program directors. In addition to her role as Communications Specialist, Eliza will be the Annual Meeting Coordinator and Director of the Winchell Undergraduate Research Symposium. Eliza graduated from the University of Minnesota in 2013, where she studied environmental science, public relations, and communication

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Special thanks to Ken Mann and Timara Underbakke for supplying most of the event photos used in the newsletter.