



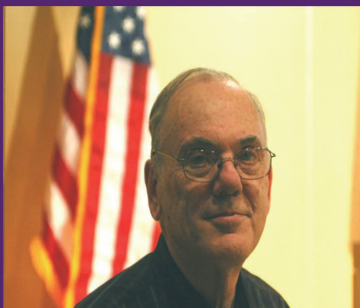
# Minnesota Academy of Science

Promoting Excellence in Science Since 1873

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Ron Voelker spoke at MinnTS



Photo courtesy Michelle Biros, MD

## MAS Participates in Minnesota Technical Symposium with Speakers Addressing Old and New 35W Bridge Issues

On March 19, MAS was one of the participating organizations in the 7<sup>th</sup> Annual Minnesota Technical Symposium (MinnTS) meeting, hosted by Medtronic. MinnTS is a collaboration of the Electrochemical Society, American Vacuum Society, American Society of Materials, Society of Applied Spectroscopy, Minnesota Microscopy Society, Society for Information Display, MN Mass Spectrometry Discussion Group and the American Institute of Chemical Engineers. They meet annually to network and attend a presentation of mutual interest.

Gary Korba performed admirably as the emcee, introducing speakers and providing some levity with innovative "awards". The evening's program consisted of presentations by Ron Voelker on "The Old 35W Bridge" and by Peter Sanderson on "The New 35W Bridge."

Ron Voelker worked as a district design engineer for MnDOT for 35 years. Using photos and construction documents, he reviewed the design of the old 35W bridge and discussed how each part of the bridge supported the next. There was no redundancy in the original bridge design and no additional safety factor built in. Consequently, when one part of the bridge failed, the entire bridge failed. The original design

had a very low safety factor that was compounded by two sets of ½ inch gusset plates that were under-designed for their load. Ron reviewed the original bridge design dead load, then subsequent additions of concrete decking, railings and median that increased the dead load by 20%.

**There was no redundancy in the original bridge design and no additional safety factor built in. Consequently, when one part of the bridge failed, the entire bridge failed.**

Coupled with the day's temperature, which also played a factor, the NTSB report on why the bridge collapsed listed several factors:

- Original dead load
- MnDOT projects that added load
- Contractor's load with construction materials
- Traffic
- Overload on the under designed gusset plates at critical points

*Bridge Collapse Continued on page 3*



## Message from the President

Last year, the Board of Director's of the Academy approved a new mission statement: "Recognize, promote and influence excellence in science." A quick check of the archives shows that this statement is really a reformulation of what the Academy has always been about: serving science and those pursuing knowledge through science. We have now created a broad strategic plan full of great new and old ideas designed to serve our scientific community.

After some study, it has become clear that our community would be well served by restarting the publication of the *Journal of the Minnesota Academy of Science*.

To this end, we solicited and gained the support of Thomson-Reuters Inc. to host an electronic version of our journal. This will be a new and exciting version of the journal complete with embedded links to supplemental video and audio content related to each article. Our vision is to recreate the journal as a fully refereed publication available to members and non-members alike. To keep costs low this will be an online only journal.

Now the hard part begins. The members of the Academy will be providing all of the editing and management of the publication. If you are interested in working on this worthwhile endeavor please contact the Academy's office at 952-545-6789.

Watch for future editions of this newsletter to see the great new programs the academy will be developing in the future.

Jim Fairman  
President, Minnesota Academy of Science

## Name the Newsletter

Help MAS name its new electronic newsletter.

Submit your ideas to [contact@mnmas.org](mailto:contact@mnmas.org) by Sept 30, 2009.

The winner will receive a  
one-year membership to the  
Minnesota Academy of Science!



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**Bridge Collapse** Continued from page 1

In Ron's opinion, the collapse would have happened regardless of the construction materials load because of previously added weight that brought the bridge to 95% of the design load.

Peter Sanderson, Flatiron project manager, used photos to relay the design and construction process for the new bridge construction. He credited MNDOT for their quick process to get the contracts, including how their final decision was reached.



**Peter Sanderson**

Flatiron was the only company to provide a comprehensive plan to construct the bridge and to solve six additional design problems. Throughout the project they coordinated efforts with more than 12 utilities and land owners including the University of Minnesota, the City of Minneapolis, the Park Board, the Corps of Engineers and others.

**This project completion schedule has now become a new standard for public projects.**

The new bridge design includes 8 foot diameter shafts drilled 100 feet into the underlying limestone bed to transfer the load. The design is based upon multiple redundancies so failure of one element will not cause failure of the entire structure. The 2" steel tendons that are threaded through concrete tunnels connect the bridge piers in a fashion similar to a suspension bridge. There are multiple sensors throughout the bridge that relay information to the University of Minnesota for on-going monitoring. The speedy construction was a combination of cast-in-place concrete technology, project management, new design processes and attention to including all stakeholders in decision making. This project completion schedule has now become a new standard for public projects.

*By Nancy Kolb, MAS Board Member*

# MAS: Supporting Minnesota Scientists at Every Stage



*Through educational programs and professional development opportunities — from middle school through professional life, the Minnesota Academy of Science supports Minnesota scientists at every stage of their development, providing a vital forum for scientific inquiry and discussion that reaches thousands of Minnesota scientists annually.*

# Message from Celia Waldock, Executive Director

As I write this message, I am winging off to Colorado Springs chaperoning six high school students who won the opportunity at our recent North Central Regional Junior Science & Humanities Symposium (JSHS) to compete at the National Symposium. JSHS and the National Symposium are sponsored by the United States Military. High school students compete at regional science fairs, are chosen to progress to our state JSHS and then compete for the opportunity to progress to National. They present papers on the results of their research projects to a panel of scientific judges.

In 2008, at National Symposium, outstanding Minnesota students won top awards. Stephen Trettel, a senior at New Prague High School, took first place in Mathematics winning a \$16,000 scholarship to his college of choice with his project: *Propellantless Propulsion: Designing a Voltage Dependant Directional Control System for Asymmetrical Capacitors*. Kate Weegman, a senior at Winona Senior High School, Winona, took third place in Engineering winning a \$2,000 scholarship to the college of her choice with her project: *Reducing Lawn Mower Emissions Using E-85 Phase 3: A Catalyst for Change*.



This is only one of many programs offered by the MN Academy of Science (MAS) in our mission to recognize, promote and influence excellence in science. I had the pleasure of attending Minnesota Technical Symposium (MinnTS) in March since MAS just became a co-sponsor of the event with several other organizations. See the article in this newsletter about the 35W bridge topic at that Symposium. The speakers were excellent!

We wrapped up our spring event calendar with our Annual Meeting/Winchell Symposium for undergraduate research papers and posters. See also, the other articles in this newsletter about that event.

The Minnesota Academy of Science is currently sponsoring many excellent programs and there are many exciting new activities on the horizon. We invite you to join us as a member. Become more involved in the Academy. There are many ways to volunteer: E-journal committee, board member, e-newsletter committee, event volunteer, to name but a few.

I hope to see you in the future.

Celia Waldock  
Executive Director

## Student (K-Graduate) \$25

- MAS newsletter
- MAS Journal

## Adult \$40

- MAS newsletter
- MAS Journal

## Teacher/Professional \$50

- MAS newsletter
- MAS Journal
- 10% registration discount for MAS events and programs
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- Email alerts about special events and programs

For Corporate Membership info go to [www.mnmas.org](http://www.mnmas.org)

*Your membership fee is tax deductible as a professional business expense.*

# Vintage MAS Proceedings

## Proceedings of the Minnesota Academy of Science 1936

Increase your viewer size to read Academy proceedings from 1936 and 1939.

Proceedings  
of  
The Minnesota Academy  
of Science

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### REPORT OF SECRETARY

During the past year the Academy has grown steadily. At the annual meeting in April, 165 were elected to membership in the Society, making a total of nearly 500.

Arrangements were completed for the housing of the Academy library in the Library of the University of Minnesota. The Academy received \$100 in grants from the American Association for the Advancement of Science. These grants are based upon the members of the Academy who are also members of the Association. Plans have been made for the awarding of these grants to worthy research workers. The 1935 grant of \$50 was given to Dr. Alfred M. Elliott, State Teachers College, Bemidji, for the continuation of his nutritional studies with protozoa. John B. Moyle, graduate student, University of Minnesota, was granted the \$50 for 1936 to study forest invasion and succession in divided areas of the northern coniferous forest region.

The Council was authorized to arrange for the institution of a Junior Academy of Science. It is planned to form this Junior section with the high school science club as a nucleus. A special committee is preparing plans for the organization of this group.

Sectional meetings were held for the first time in 1936. The Council has authorized the formation of additional sections if there is a demand upon the part of the members. Members can aid the secretary's office by reporting change of address, incorrect address, incorrect titles, etc. Criticisms are invited as they aid in furthering the aims of the society. Each member is urged to secure additional members from amongst those who will add to the strength of the Academy.

The University of Minnesota will be host at the next annual meeting to be held at University Farm, St. Paul, April 17, 1937.  
H. K. Wilson, Secretary

### FROM THE PRESIDENT

The work of the Academy, since the last annual meeting has been, and is, a continuation of the realization of its principle objectives. Among these are the dissemination of information about the natural conditions and resources of the State, seeking ways and means for their conservation and perpetuation wherever desirable and feasible, fostering the spirit of inquiry wherever desirable and research in the different fields of interest; promoting a spirit of co-operation between the varied interests and developing an increased appreciation of our main objective, namely, the furtherance, by all, of the common good in an ever continuing and ever improving democracy.

### SUMMER MEETING

The annual summer meeting of the Academy was held on September 16, 1939, in the auditorium of the Hibbing High School. This location was selected by the Council to give the members of the Academy an opportunity to secure first hand information about one of Minnesota's most outstanding industries, and to facilitate the attendance of a larger number of members living in the northern half of the State.

The meeting was attended by approximately eighty members and some visitors. After a very cordial address of welcome by Superintendent S. A. Patchin, Doctor George A. Thiel gave an illustrated lecture on the "Geology of the Arrowhead Region with Special Reference to Iron Deposits." This was followed by an illustrated lecture on the "History of the Development and Operation of Mesaba Range Iron Mines" by Doctor Stanley A. Irons. Both lectures proved to be very informing and prepared the way for a better understanding and appreciation of the after-conducted trip of the World's largest Open Pit Mine." The success of the Oliver Mining Company.

The success of the summer meeting was due in no small measure to the chairman of the local committee on arrangements, Doctor R. W. Erickson, and his efficient associates.

**COMMITTEE ON PRESERVATION OF NATURAL CONDITIONS**  
This committee, under the very able chairmanship of Doctor A. N. Wilcox, has been working most energetically and has made notable progress in recent months. At its December meeting it was decided to enlarge the committee by inviting public spirited persons from representative parts of the State into its membership.

### PROCEEDINGS, VOLUME SEVEN, 1939

The work of this committee is of vital importance to all nature lovers, and to all who are interested in preserving for future generations some of the virgin areas of field and forest which we enjoy and take for granted, but which are rapidly yielding to plough and axe, and the ever-present menace of fire. The progress report of Doctor Wilcox at the annual spring meeting will be of interest to every member of the Academy.

### THE JUNIOR ACADEMY

This organization has the enthusiasm and vigor of youth. Its membership is increasing and its endeavors promise to be greatly augmented during the current year. Professor W. C. Croxton, president of the Junior Academy, is applying himself vigorously to the task of stimulating the members to undertake various types of field and laboratory studies which will be in the nature of contributions to the science of the State. Charters have been granted to eight chapters of the Junior Academy.

In keeping with the recommendations of the American Association for the Advancement of Science two members of the Junior Academy were nominated for Honorary Junior Membership. The nominees of 1939 are Alice Buris of Albert Lea, and James Shean of Washburn High School of Minneapolis.

### EDITORIAL COMMITTEE

The committee to edit Volume VII of the Proceedings of the Academy consists of Doctor George Thiel, Doctor Palmer Johnson and Doctor H. K. Wilson, secretary of the Academy.

### PROGRAM COMMITTEE FOR 1940

The program for the annual spring meeting of 1940 will consist of three sections. The following members have kindly consented to act as chairmen of the respective sections:

Biological Sciences . . . Professor C. O. Rosendahl  
Physical Sciences . . . Professor George Glockler  
Science Education . . . Professor E. T. Tuft

Each chairman is to preside at his section meeting and to arrange the program in co-operation with the Secretary of the Academy. Pursuant to the policy of previous years the Council of the Academy authorized Doctor H. K. Wilson, the secretary, to represent the Academy at the annual meeting of the American Association for the Advancement of Science at Columbus, Ohio, December 1939.

### ANNUAL SPRING MEETING OF 1940

At the invitation of Doctor Guy Stanton Ford, President of the University of Minnesota, the eighth annual meeting of the Academy will be held on the University campus on April 19 and 20, 1940. The Council is initiating a departure from the practice of previous

## Proceedings of the Minnesota Academy of Science 1939

### 6 THE MINNESOTA ACADEMY OF SCIENCE

years when the entire program of the society was limited to one day. This year the program will open with a dinner meeting followed by a general lecture and business meeting on Friday evening. Papers of general interest will be read on Saturday forenoon. Opportunity will be given members of the Academy to visit the exhibits of the Junior Academy. Also section meetings will be held on Saturday.

The officers of the Academy sincerely hope that each and every member will continue to put forth every effort to make this meeting a genuine success.

The splendid co-operation of the officers and members of the Academy has been a true inspiration to me during the past year.

Dec. 31, 1939.

O. T. WALTER, President



## An ER Physician Reflects on a Scientific Career

In her keynote address at the Minnesota Academy of Science's Annual Meeting, Dr. Michelle Biros dug up the predictions she and her colleagues made in 1974 about the future of emergency medicine. Thirty-five years later Dr. Biros is an attending emergency physician at Hennepin County Medical Center (HCMC), Professor of Emergency Medicine at the U of M and HCMC, Associate Research Director of Emergency Medicine at HCMC, and Vice Chair of Research for Emergency Medicine at the U of M. Her primary research interests are neurological emergencies, biomedical ethics, and psychosocial aspects of emergency care.

Dr. Biros is also very interested in the teaching of research concepts and principles. Besides developing a lecture series on the "Fundamentals of Research," she lectures routinely on the art of scientific writing. She has served as editor-in-chief for the journal, *Academic Emergency Medicine*. In 1994, she founded and co-chaired the Coalition of Acute Resuscitation Researchers assisting the FDA in redesigning the regulations that govern human subjects research in the US.

Dr. Biros' predictions for changes she would see during her career included: the work week reduced to 20 hours; the United States becoming totally green; and computers dominating the work place, schools and home.

As it turns out, it wasn't all wishful thinking. While not everything she predicted in 1974 came true, Dr. Biros has seen many changes in emergency medicine over the years which she shared during her keynote address.

Among those she cited were social changes that have had a major impact on her work. The leading cause of trauma death in children under the age of one year? Intentionally inflicted trauma resulting from the

increasing violence in our society. The demographics of her patient population have changed — one-third of her patients do not speak English at home. The impact of the developing world can be seen in her Emergency Department; she is treating cases of diseases she never thought she would encounter in her career — Avian Flu, drug resistant Tuberculosis and Dengue Fever. She has also seen the failure of primary care. Insurance companies have become the gatekeepers of medical care forcing many uninsured patients to seek treatment in an emergency room thus creating significant overcrowding in emergency departments.

Specific case management is different in the 21<sup>st</sup> century. Procedures have changed in the immediate response and treatment of patients brought in suffering from such problems as stroke, myocardial infarction and trauma. In 2005, the MN Legislature approved and funded a state trauma system. Trauma centers make it possible for the effective management of disaster cases such as the successful treatment of 25 critical patients brought into the HCMC Emergency Department within two hours of the collapse of the 35W bridge last August.

A patient with a heart attack can now be transported from Grand Rapids to a Minneapolis hospital and be in a catheterization lab within 120 minutes using medical helicopters situated throughout the state. Ultrasound equipment is common at bedside during the ED assessment, allowing quicker, more accurate initial diagnoses thus decreasing the average time to operating room and increasing patient survival rates considerably.

**By Celia Waldock, Executive Director**



**While not everything she predicted in 1974 came true, Dr. Biros has seen many changes in emergency medicine over the years.**

The Academy thanks Dr. Biros for sharing photographs from her presentation taken by emergency personnel during the 35W Bridge collapse. The picture on page 1 is also hers.

## Annual Meeting / Winchell Symposium Hosts Hundreds

Upon entering the room where presentations are occurring at the MN Academy of Science's Annual Meeting/Winchell Symposium, one quickly realizes the importance of the meeting by the simple fact that the participating college students have transformed themselves from flip-flop, sweat-pant, sweatshirt wearing individuals, to studious looking, serious lecturers. During Friday night's poster session, the walls are lined with students and their projects; there is a quiet buzz of questioning by curious onlookers and explanations by presenters. Regardless if the presentations are held in a gym or ballroom, the energy in the room is palpable. On Saturday morning, the energy is much the same. There is usually a smaller crowd of presenters, students who have come prepared to give 15-20 minute oral presentations to students and judges in a similar discipline. Students are then judged for their oral presentation; one winner is picked in each session. At Saturday's luncheon there is an awards ceremony for Best in Session winners.

Each year, the MN Academy of Science's Annual Meeting/Winchell Symposium is host to hundreds of undergraduate students. The two-day meeting gives students the opportunity to present their research to other science students, professors, and professionals in science. Participants gain experience in public presentation, which is something they will encounter again regardless of their chosen field. In addition to the presentation experience, meeting participants and attendees attend dinner Friday night, which includes an address by a keynote speaker.

This year's speaker was Dr. Michelle Biros, Attending Emergency Physician at Hennepin County Medical Center (HCMC) and Professor of Emergency Medicine at the University of MN and HCMC. She is currently the Associate Research Director of the Department of Emergency Medicine at HCMC and Vice Chair of Research for the Department of Emergency Medicine at the U of M. Her primary research interests have been neurological emergencies, biomedical ethics, and the psychosocial aspects of emergency care. Dr. Biros' address focused on the changes that have occurred in emergency medicine over the last 20 years.

The Annual Meeting/Winchell Symposium has occurred annually for more than 75 years and continues to be a success. The meeting has included various components, including professional symposia, informational tables for graduate programs, graduate student luncheons, to name a few, but each year one thing remains the same — a high quality experience for undergraduate students.

*By Megan Buchanan, Annual Meeting Coordinator*



Pictured at right is Winchell Symposium entrant Michelle S. Nyamusharrya, a student at the College of St Catherine, St Paul.

St. Kate's hosted this year's Annual Meeting and Undergrad Symposium.

## Representing MAS at the American Junior Academy of Science

*Madelaine is a student at Breck School, in Golden Valley, MN. She will be attending Yale University next year. She researched the human immune response to pig cells in order to gain a better understanding of immunosuppressive drugs that will be needed for pig-to-human islet transplants to cure type-1 diabetes. Madelaine researched for two summers at the Diabetes Institute of Immunology and Transplantation at the University of Minnesota.*

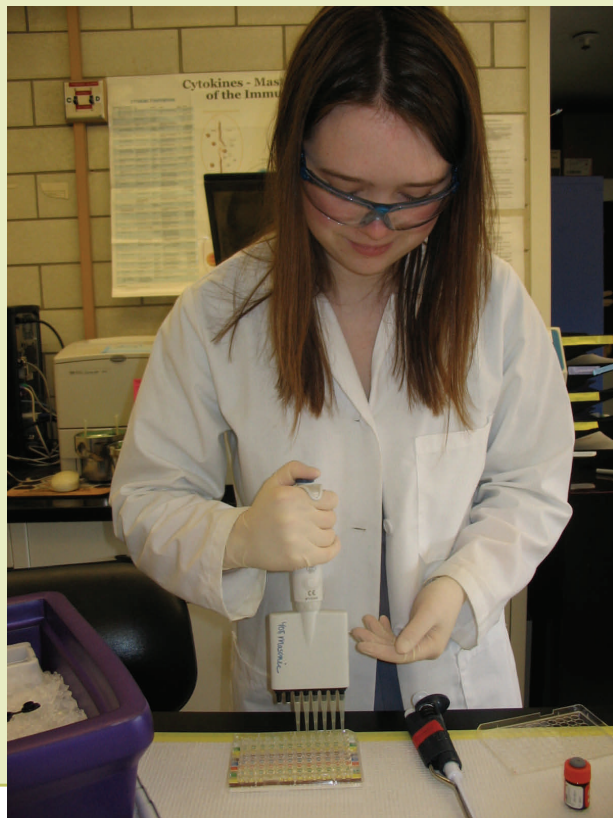
AJAS, or the American Junior Academy of Science, is in its own words “the only national honor society recognizing America’s premier high school students for outstanding scientific research.” The society meets once a year, alongside the American Association for the Advancement of Science (AAAS), where students who have been chosen by their state Academies of Science are given the opportunity to present their research and meet with top scientists attending the AAAS meeting.

Last year, I was fortunate enough to be chosen by the Minnesota Academy of Science to attend and present my research at the AJAS convention, held February 2009 in Chicago, IL. From the 11<sup>th</sup> to the 15<sup>th</sup>, I not only got the chance to participate in the numerous AJAS-specific activities, but, as an AJAS delegate, I was given full access to the entire AAAS convention, truly an amazing opportunity to learn from the hundreds of attending scientists. We heard James J. McCarthy, AAAS President, deliver a detailed address on climate change, and I attended a seminar explaining how scientists’ emphasis on the leading edge of research led reporters to the mistaken impression that the scientific community disagreed about climate change.

Easily my favorite event of the convention, however, came on Thursday, when the AJAS delegates took a full-day tour of both Fermilab and the Argonne National Laboratory. From pi-shaped power poles to levitating superconductors, both labs were fascinating and extremely informative – just as I thought, leaving Fermilab, that I understood why particle accelerators were useful, we arrived at Argonne and witnessed a totally different use of the same basic technology. We also had the chance to have a “Breakfast with Scientists” one morning.

I was fortunate enough to sit at the table with Dr. Jonathan Haas, a curator at the Field Museum, who also gave us an introduction/tour of the new Americas exhibit. By allowing me to attend and present at the AJAS meeting this past February, the Minnesota Academy of Science provided me with a unique opportunity to meet with scientists from around the world, both high schoolers also attending and presenting at the Junior Academy meeting and AAAS members. Without the generous support of the Minnesota Academy of Science, I would never have been able to attend such an interesting, engaging event, and I am very grateful for the opportunity.

***By Madelaine Taft-Ferguson***







## MN State Regional Science Bowl for Middle School Students

## MN State Regional Science Bowl for High School Students

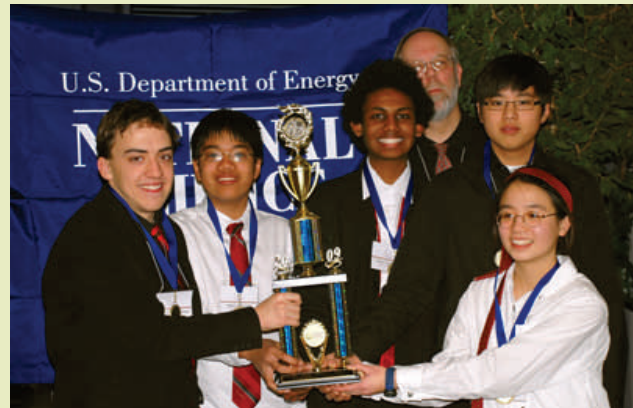


All eyes in the room are upon student #3 sitting at the front of the room who has just buzzed in poised to answer the question, "For a circuit with a current of 3 amperes, operating for 5 minutes, how much charge, in coulombs, has gone by any point in the circuit?" With a correct answer, she can force a tiebreaker and move her team closer to the final round of the **MN State Regional Science Bowl for High School Students**. The volunteer moderator, a professional scientist from General Mills, acknowledges the student and waits for her answer. Without hesitation the student answers, "900 C." Of course the answer is correct as  $DQ = 1 DT$  ... Since coulombs is in seconds, convert 5 minutes into 300 seconds and multiply by 3 C/s = 900 C. The team pumps their fists in the air and let out their restrained energy with a bold, "Yeah!"

Teamwork, camaraderie and educational excellence in the sciences are only some of the by-products of the **Science Bowl** program of the Minnesota Academy of Science. Other goals include enhancing the students' interest in science, developing leadership skills, providing opportunities for interaction between students and scientists, promoting ethical standards of conduct and influencing students' decisions to pursue careers in science.

The Minnesota Academy of Science held the **MN State Regional Science Bowl for High School Students** on January 23, 2009 at Macalester College. The **MN State Regional Science Bowl for Middle School Students** was held on February 21, 2009 at the University of Minnesota – Institute of Technology. Between the two events, 39 teams consisting of 189 students and 24 coaches participated. The **science bowls** test teams of students utilizing a fast-paced question and answer format similar to the TV game show *Jeopardy*. Teams were tested on a variety of science disciplines including earth, physical, and life sciences, general science, and mathematics. Many of the teams spent months preparing for the event.

The winning teams were from **St. Paul Central High School** and **Springfield Public School** (middle school). Each team received a team trophy, individual medals, a \$1,000 check for their school science department and an all-expense-paid trip to Washington, D.C. to compete against the other regional winners in the Department of Energy (DOE) National Science Bowl finals, April 30 – May 5, 2009.



A total of 86 scientists from local educational institutions and scientific companies volunteered to staff the two competitions. They served as proofreaders, moderators, scorekeepers, timekeepers, scientific judges, rules judges and room runners. Many of these scientists chose to volunteer two full days within a month to make these events happen.

The Minnesota State Regional Science Bowls were sponsored by contributions from Ecolab, General Mills, Great River Energy, Macalester College and the University of Minnesota-Institute of Technology.

*By Lisa Warbritton, Science Bowl Coordinator*



# JSHS MN Science & Engineering Fair REAP



Fun was what it was all about: exciting research paper presentations, fascinating speakers, entertaining activities, networking with scientists, and making new friends at the 41st annual North Central Regional Junior Science & Humanities Symposium and the 72<sup>nd</sup> annual MN State Science & Engineering Fair - held at the Crowne Plaza Riverfront Hotel, St. Paul, MN March 28/29 and March 29-30.

The Junior Science and Humanities Symposium (JSHS) is a scientific research paper competition in which students present the results of their research paper in power point form to a group of judges. Following the National JSHS guidelines, the students have 12 minutes in which to present their research followed by a six minute Q & A by the judges. The North Central Regional JSHS is for students in grades 9-12 in the Tri-State (Minnesota, North Dakota and South Dakota) area.

JSHS has an emphasis both on sharing and doing science. The program is modeled after professional scientific symposia: students present the results of their independent research orally in a competition that is as much forensic as scientific. 71 students, (41% male / 59 % female) from 28 schools, representing 33 cities, presented 61 papers this year. The event was expanded in 2009 to include 14 additional presentations and 5 additional awards.

The North Central Regional JSHS welcomed participants and adults with an opening ceremony featuring keynote speaker Dr. Eugene Kwon, MD Associate Professor of Immunology from the Mayo Clinic, Rochester, MN. Dr. Kwon entertained both students and adults alike with his presentation on immune responses to treat relatively advanced forms of malignancy.

The Reid Kennedy Jazz Trio, <http://www.reidkennedy.com/> entertained during dinner while speakers from Mad Science of Minnesota, [www.madsciencemn.org](http://www.madsciencemn.org), were able to "electrify" the audience during an evening demonstration while students got to burst hydrogen balloons in balls of fire.

After two rounds of presentations, winners were announced at the Sunday morning awards ceremony. Six students, **Stephen Trusheim**, Breck School, Minneapolis; **Travis Spangler**, Breck School, Minneapolis; **Michael Cherkassky**, Edina Senior High; **Michael Crump**, Breck School, Minneapolis; **Sahar Hakim-Hashemi**, Breck School, Minneapolis; and **Sierra Danforth**, Breck School, Minneapolis won an all-expense paid trip to compete or attend the National Symposium in Colorado Springs, CO April 29-May 3. Two students, **Emily Nimmer**, Breck School, Minneapolis and **Sharmila Ahmed**, Burnsville High School, won an all-expense paid trip to attend the American Junior Academy of Science conference February 18-22, 2010. **Lena Swander**, Cloquet High School; **David Erdahl** and **Neil Erdahl**, Austin High School, were alternates.

Five students, **Anushua Bhattacharya**, Lake Junior High, Woodbury; **Madelaine Taft-Ferguson**, Breck School, Minnea-

polis; **Daniel Mokhtari**, Breck School, Minneapolis; **Raghav Chandra**, Century High School, Rochester; and **Riya Madan**, Century High School, Rochester, were recognized for Outstanding Student Achievement with a \$50.00 cash award.

Two Research & Engineering Apprentice Program (REAP) scholars presented their summer research from 2008 at the JSHS awards ceremony.

**REAP** is a program designed to encourage high school students to pursue careers in science, technology, engineering and math (STEM). This is accomplished by offering a hands-on experience in research and development activities to students who may choose to continue their education in those fields. Established in 1979 with grants from the research offices of the U.S. Army, REAP is administered by the Academy of Applied Science. **Juhee Kwon**, Maple Grove Senior High; **Michael Pickett-Leonard**, Burnsville High School; and Alternate **Riya Madan**, Century High School, Rochester won this year's REAP scholarships closing out the 41st Annual North Central Regional JSHS.

The **Minnesota State Science & Engineering Fair** is an annual event that showcases Minnesota's best and brightest students in the fields of Science, Technology, Engineering, & Math. It is the culmination of Regional MN Fairs occurring throughout the state. More than a competition, the MN State Science & Engineering Fair champions the research young scientists have conducted throughout the year (with teacher and mentor support) and provides the opportunity for them to present and dialogue about their work. Students conduct their own original research and present it before a number of judges at students' display boards. They learn individually and from others by discussing the nature of the scientific inquiry, defending their reasoning, and articulating their specific findings orally and graphically with a display board. Students are evaluated on four criteria: the process of science; the effectiveness of communication; the context of the project; and their scope of understanding.

From approximately 2,500 regional participants, about 450 are selected to present display boards at the MN State Science & Engineering Fair. At the fair, over 75 organizations and businesses present over 300 awards to students with outstanding projects. This year there were 442 students participating, 45% male, 55% female, with 382 projects. These students were from 105 schools representing 117 cities.



The students and adults had time to set up then unwind with opening ceremonies that included a welcome address from Assistant Commissioner of Education Karen Klinzing and the VP of 3M Foundation and Community Affairs Alex Cirrilo. Students gave some great shout outs from their regions as all the regions and cities were acknowledged. Everyone then went over to the Science Museum of MN for a buffet dinner and exhibit walk through.

*Science Fair continued on Page 14*



## What a Rush: STS Memories

What a rush. Those are the best words to describe how it felt to be an Intel Science Talent Search finalist. Just two months ago, I spent a week in Washington D.C. as one of 40 finalists in the 2009 Intel Science Talent Search, an experience which I do not hesitate to say will be the capstone of my entire high school career.

The Intel Science Talent Search competition in and of itself was a formidable experience. The judging was the most comprehensive, the most difficult, and the most rewarding that I have experienced, and I have competed in a number of science fairs and related competitions. It was a daunting task to answer questions in front of panels of expert judges who asked me about a number of scientific fields — not just about my project on infectious disease. I was amazed how their questions made me think about science in new and different ways and stretched me to consider broader implications and limitations of my own study. When I later met with my judges, I learned much about their work and heard their advice both on science careers and broader topics, such as United States policy, colleges, and helping others in science — all of which added up to a tremendously inspiring week.

While the judging was amazing, it was the events we finalists attended that made the week unforgettable. I was interviewed by two radio stations and the *Star Tribune* — the article now hangs on the trophy wall at my school. I heard speeches by Colin Powell and Steven Chu. I presented my project to interested media stations and members of the public, had a minor planet named after me, was honored at a black-tie gala in front of 600 prestigious scientists; and, my personal highlight, I met and shook the hand of the 44<sup>th</sup> President of the United States, Barack Obama. On top of that, I spoke with CEOs, vice presidents, Nobel Laureates, and researchers from Intel and other major technology companies. But, even better, I met 39 amazing science students from across the nation — and somewhere between our visits to the Capitol, our presentations at the National Academy of Sciences, our nightly formal dinners, our meeting with President Obama at the White House, and our long nights at the historic St. Regis Hotel, I gained 39 friends who will stay with me throughout my life.

While I didn't win the grand prize \$100,000 scholarship, I came out on top at STS, winning thirty-nine new wonderful friends. I truly hope that other Minnesota science students, like me and like my friend and fellow 2009 STS Finalist Michael Cherkassky, have the same opportunities that I enjoyed through the Science Talent Search.



**By Stephen Trusheim**

**Jim Fairman**, *President*  
Science Museum of MN

**William Bessler**, Ed D., *Past President*  
Minnesota State University – Mankato  
Retired

**Karen Newell**, *Secretary*  
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**Garret Bitker**, *Director*  
ACL School

**Rebecca Cowen-Hoye**, Ph D., *Director*  
Macalester College

**Lois Fruen**, *Director*  
Breck School

**Todd Hauschildt**, *Director*  
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## Two Teachers Win Seagate Science Mentor Awards

Two Minnesota science teachers have been chosen to receive Seagate Science Mentor Awards, a statewide recognition for educators who have mentored student participants in the regional science fairs across Minnesota. The awards were presented at the Minnesota State Science and Engineering Fair awards ceremony, March 30 at the Crowne Plaza Hotel in St. Paul. Receiving the Seagate Science Mentor Awards for 2009 are **Sonja Dunlap** from Murray Junior High School in St. Paul and **Lois Fruen** from Breck School in Golden Valley.

Seagate Science Mentor Awards recognize junior and senior high school science teachers who have found creative ways to nurture students' interest in scientific inquiry and promote science education in their schools. The award criteria specifically considers the nominees' support of students' hands-on projects and experiences outside the classroom that generate interest in the fields of science, technology, engineering and math (STEM). There are two award categories – one for a teacher with 1 to 10 years of experience, and another for a teacher with 11 or more years of experience.

"The Seagate Science Mentor Awards are very significant, because the teachers are nominated by their students, parents and school staff," said Lise Weegman, director of the State Science and Engineering Fair, Minnesota Academy of Science. "These educators have gained the respect of their students and peers and have made exceptional contributions in promoting science and influencing students to consider STEM-related careers."

Receiving the award for teachers with 1 to 10 years of experience is Sonja Dunlap, who is a science teacher at Murray Junior High School in St. Paul. Dunlap was nominated because of her ability to provide a learning environment that excites and inspires her students to take on challenging science fair projects and work to their full potential. According to her students, when obstacles arise as they prepare their science fair projects, Dunlap is there to help them overcome those hurdles. She builds the student, teacher, parent team and brings out the best in her students by understanding and adapting to their learning styles. Many of Dunlap's students have continued their participation in the Twin Cities Regional Science Fair and State Science and Engineering Fair during their senior high years. She has mentored them, along with her junior high students, going above and beyond expectations year after year.

"Mrs. Dunlap's teaching helped me fall in love with science," said Chee Xiong, now a senior at Como Park Senior High in St. Paul, who helped nominate Dunlap for the award. Xiong participated in both the Minnesota State Science and Engineering Fair and the International Science and Engineering Fair (ISEF), the world's largest international pre-college science competition, in Reno, NV, May 10-15, 2009.

*Seagate Science Mentors Continued on page 14*

# From Rock Star to Doc Star

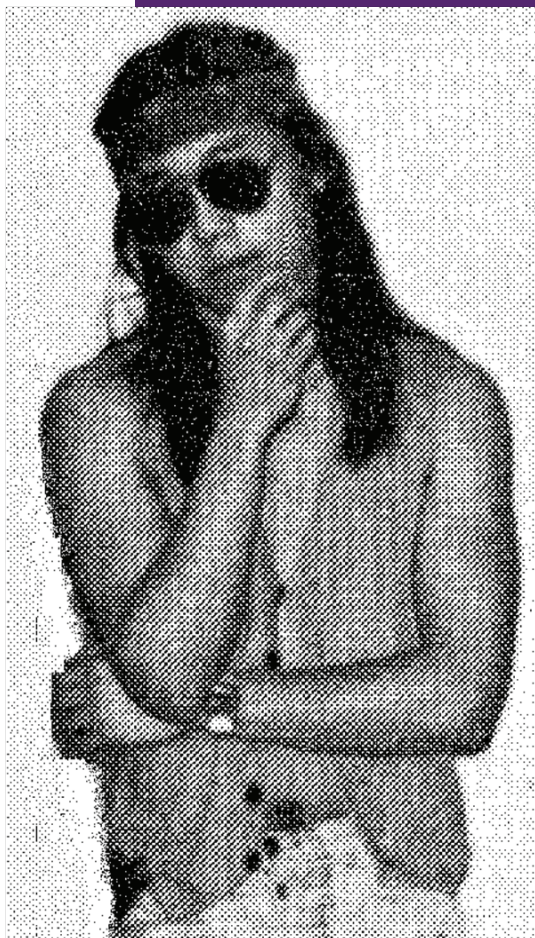
Featured Junior Science Humanities Tri-State Symposium Keynote speaker Dr. Eugene Kwon always wanted to be a rock star. Fortunately for his mother and all of us, his inability to actually play the guitar changed his career path and he went on to medical school.

Dr. Kwon is currently serving as Associate Professor of Immunology and Associate Professor of Urology at Mayo Clinic. His research focuses on methods to evoke a potent immune response to treat relatively advanced forms of malignancy. His specific areas of research pertain to the preclinical and clinical use of novel vaccines and antibodies to activate antitumoral T cells; the use of hormone manipulations to boost or rebuild host immunity; and the treatment of patients with immunotherapy in order to induce clinical tumor regression. A special emphasis is placed on developing highly state-of-the-art immunotherapies to be tested in clinical phase I or II trials to treat patients with prostate, kidney or bladder cancer.

In his keynote address, Dr. Kwon explained what our immune system is—the B cells and T cells in our blood that respond to foreign invaders fighting off bacteria, viruses, fungi, and cancer, and developing our bodies' immunities.

For our viewing pleasure, Dr. Kwon's PowerPoint presentation featured close-ups of zits, various poxes, polio victims and bodies in the full spasm of Tetanus. Dr. Kwon went on to explain how the first vaccine for smallpox (Variola Vera) was developed and then how vaccines work.

Dr. Kwon used the example, among many, of Guillain-Barré Syndrome to illustrate how our immune system can go awry and turn on us citing the possibility that given his symptoms, Franklin Delano



Roosevelt might actually have been suffering from Guillain-Barré rather than Polio. He explained how our immune systems can fail to detect foreign invaders such as Acquired Immune Deficiency Syndrome (AIDS) or parasites and how the immune system can be manipulated into attacking cancer cells, citing the new cervical cancer vaccine.

He concluded that relatively little is known about how the immune system works and that we still do not know how to treat many new devastating forms of disease that have the potential to wipe out humanity. He pointed out the great need for scientists, teachers and health care workers to protect future generations and encouraged our students to realize that they could make a big difference in the world, to be passionate in all their endeavors, to believe in themselves and to pay it forward.

All in all, Dr. Kwon's keynote address was a highly entertaining and informative presentation, with truly gross visuals.

*By Celia Waldock, Executive Director*

Dr. Kwon's research is supported by a DOD NI Award (PC 991568), DOD IDEA Award (PC020574), NCI/NIH R01 (CA82185), a CaPCure Award and a new DOD-sponsored multi-center Phase II Trial Award (DAMD 17-02-1-0245 & DAMD 17-02-1-0245S1) entitled, *A Phase II Immunotherapeutic Trial, Combined Androgen Ablative Therapy and CTLA-4 Blockade as a Treatment for Advanced Prostate Cancer.*



**Seagate Science Mentors** Continued from page 12

Lois Fruen, science teacher and science department chair at Breck School in Golden Valley, will receive the Seagate Science Mentor award for teachers who have 11 or more years of experience. During her more than 30-year teaching career at Breck School, Fruen has guided the development and implementation of a research-based science curriculum. This approach has been used to build community throughout the entire school by having students at different grade levels complete scientific research together. Ms. Fruen is a MAS board member.

“Mrs. Fruen is, without a doubt, the most influential teacher I have had in my life,” said Stephen Trusheim, a Breck School senior who is one of 40 finalists in the national Intel Science Talent Search competition and a participant in the Minnesota State Science and Engineering Fair. “She has inspired me to move beyond classroom science, and she has given me the motivation to excel as both a scientist and individual.” Like Xiong, Trusheim also participated in ISEF in May.

“It is a privilege to recognize these outstanding teachers for their commitment to generating student interest in hands-on science,” said Bob Whitmore, chief technical officer at Seagate. “They have proven track records of nurturing scientific inquiry through mentoring students, promoting creativity, and reinforcing the practical application of skills.”

Award winners receive a plaque and \$1,000, and their respective schools also receive a plaque and \$1,000 for their science programs.

**Science Fair** Continued from page 10

Along with judging of projects on Monday, students and adults were able to attend science demonstrations put on by the 3M Visiting Wizards, as well as educational workshops titled: *Financing Regional Science Fairs* and *Incorporating Science Fairs into Classroom Curriculum*.

The Monday night awards ceremony was emceed by Ed Neu and Rich Seger of Seagate Technology, and the keynote speaker was Chris Shaffer, Meteorologist from WCCO Channel 4 News. The first round of awards (both Seagate awards and MAS grand awards) took place on Monday evening followed by a dance for students. Special corporate, organization and government awards were announced Tuesday morning along with an exciting presentation about *Dragonfly TV* from Richard Hudson, Director of Science Production at Twin Cities Public Television.

Major corporate sponsors of these events include: Seagate Technology, 3M, Ecolab, and Medtronic.

*By Lisé Weegman, MSSEF Director*

**The Minnesota Academy of Science would like to gratefully acknowledge our sponsors**

