South Dakota Science Teachers' Association

Spring 2015

April 2015 **Volume 136**

President's Letter—Julie Olson

Happy Spring to Everyone!

I cannot believe April is almost here. Of course, this is South Dakota – as they say "Wait a minute, the weather will change." I think we are safe from sub-zero temperatures though.

We had a terrific conference with more vendors than before as well as attendees. There were almost too many choices for sessions to go to. Thank you again to our featured speakers, Dr. Cathy Ezrailson and the South Dakota Highway Patrol. Our banquet speaker, Bill Zubke, has us rolling on the floor and standing on our chairs. We also honored Molly Tenbroek with the Distinguished service award and Sanford Research with the Friend of Science award.

There are all kinds of things related to science going on, nationally and state-wide. My husband will be the first to say that I am not very politically inclined. He was a state senator and representative for over 10 years. I think I went to two political events the entire time. Would you believe I have written both of my representatives and senator this year alone?!!! And even testified to the state board of education in support of the proposed South Dakota Science Standards! It amazes me how I can get in front of a room of students and feel so at ease and then become borderline blubbering idiot in front of other adults.

There were several members of the SDSTA that attended the national NSTA convention in Chicago in March. Liz McMillan and I attended a day-long regional training session with 7 other regions. The most profound lesson I learned was when a speaker, Dr. David Crowther from University of Reno Nevada, gave a talk and lesson on teaching ELL students. He discussed levels of vocabulary that ranged from "playground" level to academic vocabulary development that ELL students go through. He posed the question - How can we teach students science if they don't even speak the language? He then proceeded to have a graduate student of his teach us a lesson on pi (π) – only speaking and writing in Bangladese! We were one confused bunch of educators but with actions, constant encouragement, and modeling we all were successful! It really gave me a new perspective on English language learners. Even though many of our own students speak English, they often do not understand the language of science so we must use other methods to teach them and to eventually develop that academic language.

My wish is for all of you to have a great last quarter of the school year and to take advantage of time to spend with your families and to engage in some professional development opportunities. Please let me know of any opportunities to share with everyone. I will be doing a Summer Educator Research Fellowship with Sanford Research this summer as well as spending time with my two children when I am in Sioux Falls during the week. I hope to make great headway on my doctoral dissertation too.

Sincerely, *Julie Olson*

Spring 2015

CSI Institute

Do you like using science to solve mysteries? So do we! CSI: Classroom Student Investigations is an excellent PROFESSIONAL DEVELOPMENT opportunity for science teachers. Forensic cases will be developed in which teachers and students will engage in inquiry-based activities to solve the cases. A wide variety of science fields (life, chemical, physical, and technology) will be included in this program. All cases will incorporate "real-world" activities and teachers will be given information how to adapt to their own classrooms. The workshop will be held June 15-26, 2015 (preference will be given to grades 7-10, but others will be considered as space allows), and a limited amount of travel support may be available. Teachers will receive room/board and up to $2000 stipend for successful completion of summer and academic year activities. Workshop is held on the campus of Arkansas State University, Jonesboro, AR. You'll have the weekend free to explore the area-go shopping, go to movies or out to eat, travel to Memphis (about an hour away) or explore the many outdoor activities in the "Natural State" http://www.arkansas.com/. For more information and application forms, see our website http://altweb.astate.edu/csiscience

This project is funded by a grant given to Arkansas State University by the National Science Foundation (NSF 09-506 Innovative Technology Experiences for Students and Teachers-ITEST)

2015 Lake and Stream Ecology and Water Quality Workshop

The Northeast Glacial Lakes Protection and Improvement Project, located in Webster, SD, is hosting a free workshop for anyone who is interested in gaining 2 continuing education credits for the summer of 2015. The workshop will be held July 15-17 at NeSoDak Camp, located on Enemy Swim Lake near Waubay, SD. The main subject of the workshop will be covering lake and stream ecology. If you are interested in earning more CEC's, or just want to learn more on our local lake and stream ecologies in the state, this workshop may be for you! I attached a flyer of more information on the workshop with this email. If you do have any more questions, feel free to contact either Dennis or I with the below information.

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Resource Technician
Northeast Glacial Lakes (NEGL) Watershed Project
Day County Conservation District
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Mobile: 605-520-9255
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Dennis Skadsen
Project Coordinator
Northeast Glacial Lakes (NEGL) Watershed Project
Day County Conservation District
Office: 605-345-4661 ext. 118
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dennis.skadsen@sd.nacdnet.net

Awards:

Physical Science Teacher of the Year Award: Laura Mehlbrech, Sioux Falls Washington High School. sponsored by 3M and coordinated by the SDSU Physics Department

Marion Fillbrandt Endowment Stipend: Shawn Wynia, Savanna Bice, Marie Gillespie, Londa Florey, Anne Erdmann, Amy Cameron

Distinguished Service Award: Molly Tenbroek, McIntosh High School

Friend of Science: Sanford Research represented by Peter Vitiello, Tamara Ledeboer, and Elizabeth McMillan

Biology Teacher of the Year: Kristin Wheaton, Sturgis Brown High School, sponsored by the National Association of Biology Teachers and Sanford Health.

Presidential Awardees for Excellence in Math and Science Teaching: Science State Finalists

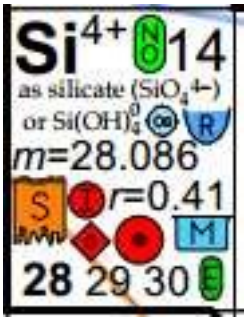
Michelle Bartels, Hamlin School District pictured with Ramona Lundberg, PAEMST state director

Roby Johnson, Holgate Middle School, Aberdeen pictured with Ramona Lundberg

Amber Stout, Jefferson Elementary School, Pierre.

Periodic Table Resources—printable periodic tables

A wide variety of periodic tables ranging from simple to complex that all can be printed on standard paper. One site even lets you design your own with different properties. There are also activities available. http://www.sciencegeek.net/tables/tables.shtml



Build a Boone - activity

Adapted from the Pittsburg Tissue Engineering Initiative

Question: How many of you have broken a bone? What factors contributed to why it broke or why you haven't broken a bone?

Part I: Research for the Engineering Design -

Research the structure and composition of a long bone. Make a detailed sketch(s) of a bone and its parts. What gives a bone its strength, composition, design, or both? Justify your answer.

Part II: Engineering goal – to build the strongest bone made out of paper.

Materials – one sheet of paper (9x12)

10 cm of tape

Scissors

Elmer's glue

Constraints

At least 22 cm long

Must pass through a 3 cm x 3 cm square hole

Cannot pass through a 2 cm x 2 cm square hole

A standard pencil must be able to be inserted at least 5 cm into each end of the "bone"

Loading Test

Materials:

Tables 13 cm apart

Balance – to determine the total mass of the bone

Ice cream pail and at least 6 total kg of weights or sand

Test:

Loading bucket will be placed in the center of the bone. All bones must hold at least 1 kg of mass

The person who designed the bone starts to load the bucket. Failure is determined when the bone and bucket drop 5 cm or gives out entirely. The last weight added does not count.

Mass of bone (kg) =

Load (kg) =

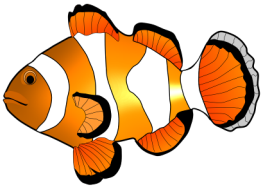
Strength (Load/Mass of bone) =

Design changes?

Questions:

1. How is your "bone" a good model of a real bone? How is it different or a poor model?
2. What contributed most to the strength of your "bone"?
3. From the class, what was different between your bone and the winning bone?
4. What was similar? (If you were the winner, what made yours superior to the others?)
5. What would you change to make the "bone" stronger? Be specific.
6. Of what importance is it to know about bone structure and composition?

Elementary/Middle Level Research Ideas for students



Fish tank:

What color do the fish prefer? Just tape colored paper side by side on the tank.

What type of food do they like the best?

What fish hang out together? If you have different types of fish in there.

What are the differences between fish? Did you know there are several kids of zebra fish! Regular, golden, long tail, spotted, glofish, etc. I have found them all in Sioux Falls.

Measuring by taking pictures? Put a plastic ruler in the tank and take a picture.

What are the parts of a fish and how do they work? There is a product called an Air Swimmer that a pretty good model of a fish swimming. Easy to control too. They could be asked how this is a good model of a real fish and how it is not a good model of a fish.

Radish or lettuce seeds: can be sprouted on Cello sponges, germinate quickly at room temperature, or can use sandwich bags with white paper towel folded in quarters moistened with water but not dripping to study germination.

Plants can be used as models (representatives of higher animals that can be tested on without harming humans.) You can also use "water beads", a water absorbing polymer that can be purchased from floral departments to sprout seeds in.

Do plants need dirt?

Monocots vs dicots (grass vs radish) – what do the plants look like when they sprout?

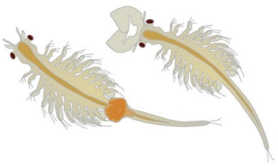
Parts of a seedling

Add caffeine beverages to the paper towel instead of water to test for toxicity to the germinating seedlings – caffeine does inhibit germination at coffee and caffeine beverage levels.

Do air fresheners help or hurt seed germination? Place the seeds on a paper towel in a baggie with the air freshener and leave air space in the baggie. Set in a box or dark drawer. It should take only a few days to germinate. Spray or liquid air fresheners can be placed on a cotton ball. Make sure the air fresheners do not tough the seeds. I have found the air fresheners that are tree shaped are very toxic to germinating seeds!

Brine Shrimp: also known as sea monkeys

Brine shrimp eggs are low cost and easy to raise http://www.wikihow.com/Raise-Brine-Shrimp The method shown on this wiki uses upside down plastic pop bottles, air stones, and a simple aquarium pump. The brine shrimp can be fed to the fish!



What type of salt do they hatch best in? get iodized, non-iodized, sea-salt, gourmet types…

Does the amount of salt matter?

Does the temperature matter?

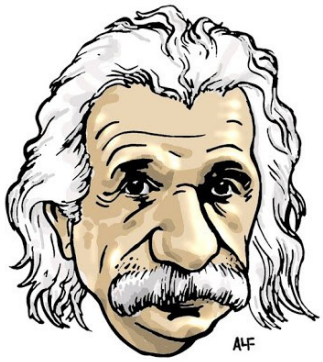
You can add different things to the water such as pop, coffee, herbal teas, Tylenol, or aspirin to test for toxicity

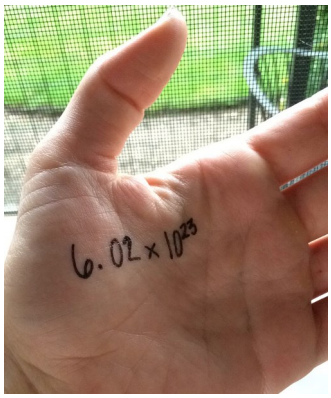
Molecularium Project

The Molecularium Project is the flagship outreach and education effort of RPI's Nanotechnology Center aimed at boosting global science literacy and encouraging young people to pursue careers in STEM. Along with Molecules to the MAX!, its educational efforts include a 23-minute, award-winning Digital Dome film, Molecularium – Riding Snowflakes, which introduced the characters Oxy, Carbón, Hydra and Mel; and NanoSpace®, an online amusement park, where the familiar film characters are transformed into game based characters. NanoSpace, winner of the Center for Digital Education 2013 Best of the Web award, includes more than 25 fun, interactive and educational games, short animated films and activities, which provide an engaging environment to demystify molecular science. Instead of textbooks, teachers and students can use games like BuildEm!, Periodic Memory and microLAB. The Project's free educator resources for grades K-4 and 5-8 are available on the website at www.molecularium.com.

Einstein in the Classroom:

- The rocket thought experiment performed by Einstein: How would it feel to be in a rocket in deep space? On Earth? Accelerated through space? Discuss what it means to be in an accelerated reference frame or a stationary (inertial) frame. Probably advanced high school topic, would be suitable for AP physics class post classical mechanics discussion.
- The bowling ball on a rubber sheet (trampoline): Have a taught rubber sheet with a heavy object (like a bowling ball) in the middle. Now roll light balls at the object, but not straight on. Notice how the ball curves around the heavy object? This is an analogy to curvature affecting the way things move. A word of caution: This is NOT a direct way to see that gravity is curvature, only an illustration. Because we experience a gravitational force on Earth, so will the light ball, and so it is not exactly the same thing. However, it is a good way to wrap your head around the idea of curvature causing movement/forces. This could work for most ages, and the depth of the discussion could be limited with younger audiences. At the youngest, talk about why the ball moves (rolls down a hill) and make the (somewhat stretched) analogy with gravity doing the same thing. At the older levels, talk about why you have to roll the ball not directly head on. Higher levels can talk about the concept of angular momentum keeping things orbiting, conservation laws, and its relation to GR (things are still conserved in GR!!!!)
- Check out the latest from the LIGO collaboration, and the APS (American physical society) on their demonstrations and videos. Also can check out the CCRG page for simulations of merging BHs.





A chemistry joke:

I found this really weird mole on my hand.
Maybe I should get it checked out??????

100th Anniversary of Einstein's Theory of Relativity—submitted by Brennan Ireland

On November 25th, 1915, Albert Einstein published a paper that would forever change the way we view the Universe. This paper described gravity - not as a force, but as a result from the curvature of spacetime. His theory would become known as general relativity, and would launch him into world fame due to its predictive power.

Einstein's idea that gravity is the result of a curved spacetime began as a very simple "thought experiment". Imagine yourself in an elevator. This elevator could be anywhere in the Universe for all you know, because you can't see out of it. (We are also going to assume that it is airtight, so that no thought experiment people will be harmed.) This elevator is known as your reference frame. If we put the elevator in deep space, there will be no gravitational force on it, and so inside, you will feel weightless. If, instead, we put the elevator on Earth (and make sure not to move it), inside the elevator you will feel the full force of gravity, and experience your weight as normal. If we put the same elevator in deep space, but this time attach a rocket to its bottom, and set the acceleration of this rocket to be exactly the gravitational acceleration of Earth, how can you determine if you are on Earth or simply being accelerated in deep space? The answer (in this simplified picture) is that you can't know. There is no difference between being on Earth and being accelerated by a rocket. The conclusion that Einstein drew from his thought experiment is that the force we know as gravity is simply a byproduct of us having an accelerated reference frame. Ultimately, this realization led him to the discovery of general relativity.

At the beginning of the 20th Century, physics was considered to be almost completely solved. James Clerk Maxwell had recently unified electricity and magnetism into the modern theory of electromagnetism, and Newton's theory of gravity had predictive power for almost all of the celestial mechanics we observe, with one notable exception. Mercury was observed to have a perihelion precession about the Sun. Many attempts were made to "explain away" this precession, but all of them fell short of the observed precession and many introduced more problems than they fixed. Einstein's relativity changed this. By explaining gravity as a curvature of spacetime, one naturally gets precession of bodies that are close to massive objects. The fact that general relativity predicts this perihelion precession and still recovers Newtonian gravity in the correct limit was a strong indication that Einstein's relativity may be the correct theory.

The ultimate confirmation came about in 1919. Newtonian gravity predicts that if light passes close to a massive object, it will bend. Relativity predicts the same result, but by a factor of 2 more than the Newtonian prediction. It was in this year, during a total solar eclipse, that the astrophysicist Arthur Eddington measured the bending of light around the Sun and his results verified that general relativity had correctly predicted the deflection. Einstein was now famous.

The story doesn't end there. For the next century, astrophysicists would work out solutions to the Einstein equations of general relativity, leading to black hole solutions, the concepts of wormholes and causality, and even models of the Universe itself. The field of relativistic astrophysics had been born.

Tests of general relativity are still happening today. Scientists at the Laser Interferometer Gravitational-wave Observatory (LIGO) are seeking to probe the strongest regimes of gravity. In the violent merger of binary neutron stars or black holes, energy is given off in gravitational waves, ripples in the very fabric of spacetime. LIGO seeks to detect these emitted waves, which are predicted by relativity, and show again that Einstein was correct.

There are still problems with general relativity as it stands. Like at the turn of the 20th century, the theories we have don't quite explain everything. The power of general relativity is evident on large scales, but it breaks down when one tries to apply it to very small scales. The reverse is true for quantum mechanics. Quantum is extremely good at predicting the smallest scale interactions in nature, but breaks down on the macroscopic level. Scientists believe there must be a way to unify the two theories, and that effort is known as quantum gravity. Some of the most bizarre and interesting ideas have come out of this push, including loop quantum gravity and string theory. No explanation yet offered has been successful. Who knows? The person who discovers the correct theory of quantum gravity may be the next Albert Einstein.

About the Author: Brennan Ireland is currently a graduate student at Rochester Institute of Technology (RIT) in Rochester, NY. He is a member of the Center for Computational Relativity and Gravitation at RIT, where he works under his advisor, Manuela Campanelli. He is an alumnus of Rapid City Central High School and the Davis-Bahcall scholarship program. His research interests include general relativistic simulations of binary black hole mergers, specifically in the context of spinning black holes.

Continue your education as a Coyote!

University of South Dakota School of Education

Undergraduate Teaching Majors

K–8	Elementary Education
7–12	Biology, Chemistry, Earth Science, English, History, Mathematics, Physics, Political Science, Speech Communication, Theatre
K–12	Art, French, German, Music, Physical Education, Spanish, Special Education*

*Double Major: The Special Education major must be paired with Elementary Education or a 7–12/K–12 teaching major.

Undergraduate Non-Teaching Majors

Kinesiology and Sport Science
(Exercise Science or Sport Management Specialization)

http://admissions.usd.edu

Curriculum and Instruction

M.A.	Elementary Education, Technology, Secondary Education, Special Education
Ed.S., Ed.D.	Curriculum and Instruction

Counseling and Psychology in Education

M.A., Ed.S, Ph.D.	Human Development and Educational Psychology
M.A., Ed.S, Ph.D.	Counseling
Ed.S., Ph.D.	School Psychology

Educational Administration

M.A., Ed.S., Ed.D.	PK–12 Principal, Director of Curriculum, School District Superintendent
Ed.S, Ed.D.	Director of Special Education
M.A., Ed.D.	Adult and High Education

Kinesiology and Sport Science

M.A.	Kinesiology and Sport Science

(Exercise Science or Sport Management Specialization)

www.usd.edu/grad

UNIVERSITY OF SOUTH DAKOTA

SCHOOL OF EDUCATION STUDENT SERVICES
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Seeking participating classrooms for RhizoDive!
An introduction to current biodiversity research techniques and cell division through the study of native South Dakota legumes and their bacterial symbionts

Description This NSF funded project seeks to generate interest and introduce high school students to current scientific research methods by connecting South Dakota high school instructors and students with South Dakota State University researchers. Participants will achieve this goal through two objectives: Activities in **Objective 1** will study rhizobial diversity (RhizoDive) in native legumes throughout SD using next-generation sequencing and bioinformatics. Activities in **Objective 2** will use native SD legumes to study cellular division and differentiation. In **Phase 1 (Fall 2015)** high school instructors and students from 20 SD schools will collect nodulated legumes from their local communities and study cell division and differentiation in root nodules, and representative plants will be sent to the Subramanian lab at SDSU. In **Phase 2 (Summer 2016)**, eight high school instructors accompanied by two students each will attend a 2 day SDSU workshop where they will prepare the mailed in plant specimens for sequencing by isolating total DNA from root nodules and subjecting it to PCR. The Subramanian lab will coordinate sample sequencing and host data on a cloud server. The server will also host a data analysis program streamlined for high school students that will generate results such as phylogenetic trees. In **Phase 3 (Fall 2016)**, senior undergraduates and graduate students of "BIOL373 Evolution" course will perform similar data analysis and visit schools involved in the project to disseminate and discuss the results with high school students.

Throughout the project, the Subramanian lab will provide high school instructors with lesson plans, instructional materials, and technical support through a combination of social media (participating schools are encouraged to share data and experiences with each other), email, and live video chat.

The activities are geared toward high school students, however, we will accommodate other age groups (8th grade enrichment & Agriculture courses, for example). The activities will directly address:

Science standards addressed (proposed standards for adoption May 2015)

HS-LS1-4 Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. (SEP: 2; DCI: LS1.B; CCC: Systems)
HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (SEP: 2; DCI: LS1.A; CCC: Systems)
HS-LS1-1 Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. (SEP: 6; DCI: LS1.A; CCC: Structure/Function)
HS-LS4-1 Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. (SEP: 8; DCI: LS4.A; CCC: Patterns)
HS-PS4-2 Evaluate questions about the advantages of using a digital transmission and storage of information. (SEP: 1; DCI: PS4.A; CCC: Stability/Change, Technology)

Agriculture Food and Natural Resources Career Clusters

PS1.1 Describe functional differences in plant structures including roots, stems, flowers, leaves and fruit.
PS1.2 Classify plants based on physiology for taxonomic or other classifications.
B2.1 Recognize components of cells and their application to genetic improvement.
ES1.1 Examine the structure and function of ecosystems.
ES1.3 Analyze population dynamics.

Compensation

Phase 1: sample collection and shipment to Subramanian lab at SDSU
Limited funds are available through the NSF and a small stipend will be issued to the high school instructors to compensate their time.
Specimen containers and pre-addressed/postage paid envelopes will be provided by the Subramanian lab at SDSU.

Phase 2: two day summer workshop for eight high school instructors accompanied by two students each
Limited funds are available through the NSF and a small stipend will be issued to the high school instructors and travel and lodging costs for instructors and students will be reimbursed as per state rates.
Subramanian lab will cover all workshop lab materials and all sequencing services.

For more information or to sign up please contact:

RhizoDive project coordinator and designer:
Carl Fellbaum, Postdoctoral research associate
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RhizoDive creator and major advisor:
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605-688-5623

AboutGenCyber

Girls in Cybersecurity

GenCyber: Girls in Cybersecurity at Dakota State University

Learn, hack, fix, and explore cyber security! DSU GenCyber Girls in Cybersecurity is a **free** camp designed for girls entering 8th through 12th grade (anywhere in the country). Girls will participate in hands-on education sessions with professors, alumni, industry experts and current students in the one week on-campus camp. For more information, go to http://ashleypodhradsky2.wix.com/gencybergirls.

NSTA Awards

ROBERT E. YAGER FOUNDATION EXCELLENCE IN TEACHING AWARD

The Robert E. Yager Award, offered by NSTA, will recognize six (6) full-time K–12 teachers of science who successfully use innovation and excellence in their classroom each year. For the 2015-2016 school year, teachers from the District 9 states of ND, MN, and SD are eligible to apply for this award. The award consists of $1,000 towards expenses to attend the *NSTA National Congress on Science Education* held each summer, and $1,000 for the awardee. An identified Yager Scholar from the six awardees will be given additional support up to $1,500, to present at a future *NSTA National Conference on Science Education*.

Award information, a downloadable application and videos of last years' awardees are available on the NSTA awards website. I met a number of excellent educators at the SDSTA conference in February so I encourage you to apply for this award. The window for submitting applications for the 2015-16 school year will open later this year, but applications are available now.
Don't hesitate to contact me if you have any questions. --Mary Colson (mcolson@moorheadschools.org), NSTA District 9 Director

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Click on an item in the list below to read a description of the NSTA award.

Distinguished Informal Science Education Awards

Distinguished Service to Science Education Awards

Distinguished Teaching Awards

DuPont Pioneer Excellence in Agricultural Science Education Award

Faraday Science Communicator Award

Maitland P. Simmons Memorial Award for New Teachers

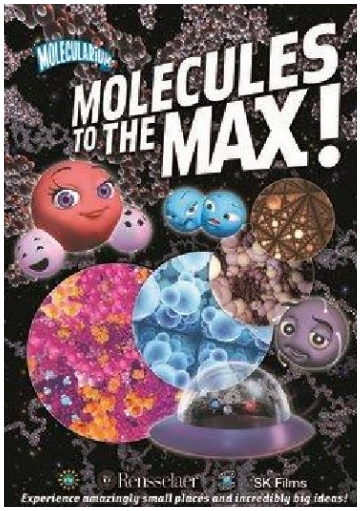
Ron Mardigian Memorial Biotechnology Explorer Award

Northrop Grumman Foundation Excellence in Engineering Education Award

NSTA Fellow Award

NSTA Legacy Award

PASCO STEM Educator Awards



The Molecularium Project is the flagship outreach and education effort of RPI's Nanotechnology Center aimed at boosting global science literacy and encouraging young people to pursue careers in STEM. Along with Molecules to the MAX!, its educational efforts include a 23-minute, award-winning Digital Dome film, Molecularium – Riding Snowflakes, which introduced the characters Oxy, Carbón, Hydra and Mel; and NanoSpace®, an online amusement park, where the familiar film characters are transformed into game based characters. NanoSpace, winner of the Center for Digital Education 2013 Best of the Web award, includes more than 25 fun, interactive and educational games, short animated films and activities, which provide an engaging environment to demystify molecular science. Instead of textbooks, teachers and students can use games like Build-Em!, Periodic Memory and microLAB. The Project's free educator resources for grades K -4 and 5-8 are available on the website at www.molecularium.com.

DESIGN A DNA EXPERIMENT FOR SPACE

GENES IN SPACE IS A NATIONAL CONTEST INVITING TEACHERS AND STUDENTS TO DESIGN EXPERIMENTS THAT WILL SOLVE REAL-LIFE SPACE EXPLORATION PROBLEMS THROUGH DNA ANALYSIS. Be a Pioneer.

MISSION

Help design a pioneering experiment that will open an era of DNA exploration in space. Crew: U.S. students and teachers interested in science, technology, and space, in grades 7 through 12. Location: International Space Station.

Contest Closing Date: April 30, 2015.

Life as we know it is encoded in DNA. On Earth we use a process called PCR (Polymerase Chain Reaction) to rapidly detect and analyze DNA. PCR can make billions of copies of specific DNA sequences for study, in a process called DNA amplification. PCR has never been done in space, and now you can be among the first to propose a DNA amplification experiment for the International Space Station.

If you win, your design will become one of the first ever DNA experiments in space!

FINALISTS WILL

Receive mentoring and coaching from Ph.D. scientists

Present their proposals at the ISS Research and Development Conference in Boston, MA.

Be awarded free miniPCR™ equipment for their educational institution.

WINNER WILL

Have their experimental design carried out aboard the ISS.

Be invited to witness the rocket launch.

DOWNLOAD THE E-FLYER

Universities Team with K-12 Schools to Improve Math and Science

FOR IMMEDIATE RELEASE:

PIERRE, S.D. – Six projects involving public universities and K-12 schools will receive nearly $270,000 in federal grant funding to improve science and mathematics instruction in middle and high schools.

The Title II grants from the U.S. Department of Education pair university science, math, and education faculty with teachers and administrators from high-need school systems to develop relevant professional development activities. About 125 teachers from across South Dakota will participate.

The partnership grants, each to be funded between $29,000 and $50,000, include:

- South Dakota State University and **school districts from Waubay and Chamberlain** for "Using the CCSS-M Mathematical Practices to Promote High Quality Instruction" project.
- SDSU and the **White River School District** for "Engineering the Future 2015" project.
- SDSU, along with **Newell and Hoven school districts,** for "STREAM: Science Technology Resources for Engagement Activity Modules for 2015" project.
- Black Hills State University and **school districts from Bennett County, Newell, and White River** for "Life Science Concepts for Teachers" project.
- BHSU, **Bennett County School District, and Todd County Middle School** for "Embedding the Standards for Mathematical Practice within the Common Core State Content Standards Year 2, West" project.
- BHSU, the Sanford Underground Research Facility, and the **Huron and Chamberlain school districts** for "Physics of Atomic Nuclei: Connecting Content and Practices with Applications, Careers and the Sanford Underground Research Facility" project.

The grants engage teachers in specialized summer workshops and follow-up activities that lead to implementation of lesson plans in math and science throughout the school year. The South Dakota Board of Regents administers the federal grant funds.

The projects will bring together higher education faculty, local school systems, and other education agencies and partners to achieve statewide impact. Funding runs from April 2015 through September 2016.

The "Engineering the Future 2015" summer workshop for teachers will be held on the campus of South Dakota State University July 22-26, 2015. This workshop is open to any high school science teacher in South Dakota. Registration for the workshop is open until May 1 or until filled. (Note – If you attended the "Engineering the Future 2012 or 2014" workshop, you would not be eligible to attend this one but we encourage you to invite fellow science teachers in your school/district to apply.)

During the week-long workshop, teachers will learn about the various types of engineering fields (mechanical, civil, environmental, agricultural, electrical, etc.) and participate in hands-on activities which can be implemented into their classroom. The workshop will focus on engineering principles specifically addressed in the Framework guiding the development of the Next Generation Science Standards. Teachers will work directly with engineering, science, and education faculty while at SDSU who will assist them in implementing/modifying engineering-related activities for their science classroom.

Housing and meals will be provided to teachers during the week. In addition teachers will receive a $100/day stipend (sent after the workshop) and materials/equipment for their classroom. The workshop will be available for two hours of graduate credit (at reduced rates) with another optional credit hour available during the SD Science and Math Teachers Conference in Huron in February 2016.

If you would like to apply to attend the workshop, fill out the application at http://etf2015.questionpro.com. Space is limited so if you are interested, apply now!
(This workshop is made possible by a No Child Left Behind grant from the South Dakota Board of Regents.)

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DRAFT --- SDSTA Position Statement on Science Standards --- DRAFT

The South Dakota Science Teachers Association (SDSTA), a statewide organization representing public and private science educators, believes that science literacy is crucial for future careers and community success. Together we also believe that the 21st century requires a scientifically literate citizenry with an ability to think critically and utilize the scientific practices and engineering design process. As such, SDSTA is deeply interested in the work of the Department of Education and the workgroup of educators, industry representatives, parents, and community members developing the 2015 proposal for SD science standards.

The South Dakota Science Teachers Association endorses the following key components of science standards for the state of South Dakota.

- Standards should define student learning expectations without prescribing specific methods, materials, and experiences.
- Standards should reflect academically rigorous content with a clear, robust progression from kindergarten through elementary, middle, and high school preparing South Dakota students to compete globally for 21st century careers.
- Standards should have purposeful scaffolding that allows students to grow and develop skills and knowledge throughout their K-12 science education. Scaffolding should allow for children to continually build on and revise their knowledge and abilities, bridging levels over K12 timeline.
- Standards should function as outcomes that clarify what students should know and what they should be able to do at the end of a grade or developmental level.
- Standards should be culturally appropriate and adaptable so teachers can be responsive to the wide variety of communities in South Dakota.
- Standards should equip South Dakota students with skills needed to be critical thinkers and successful citizens prepared to create and innovate.
- Standards should require students to go beyond basic data collection to actively question, evaluate, and argue findings based on empirical evidence.
- Standards should include application of scientific processes and procedures that allow students to ask relevant, testable questions to define and design solutions with application to novel situations.
- Standards should reflect current practices in research and education and mirror real world science application and interdisciplinary approaches allowing for connection to other disciplines such as English, math, and social sciences.
- Standards should allow for interconnectedness among science disciplines integrating chemistry, biology, physics, and the Earth sciences.

SDSTA supports the 2015 proposed South Dakota Science Standards developed by the SD Department of Education and the 2014 Workgroup utilizing best practices, research, and national resource documents as a guide and meeting our expectations for quality science standards as defined above.

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Email comment to presidesnt@sdsta.org as soon as possible.

Is the Most Massive Star Still Alive?

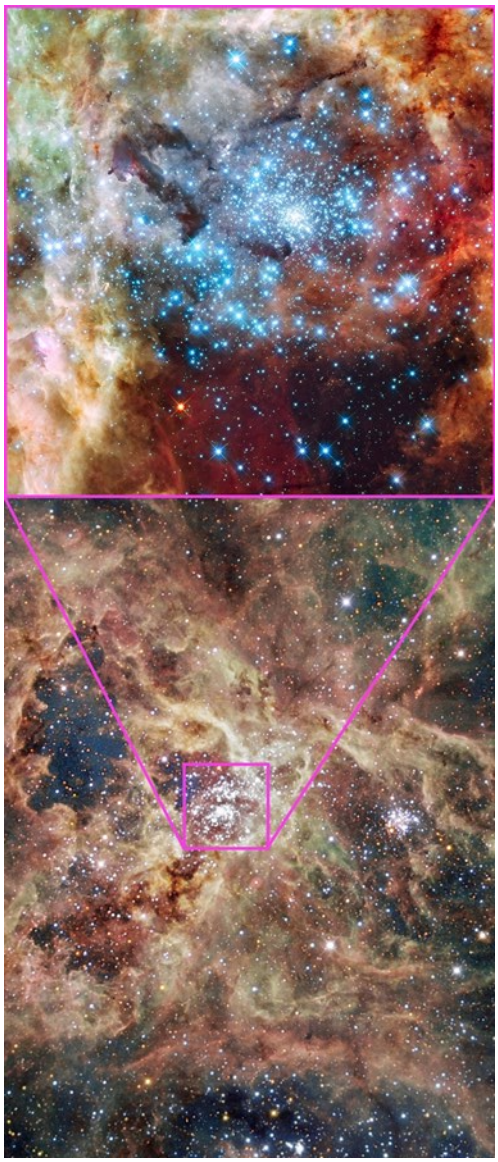
By Ethan Siegel

The brilliant specks of light twinkling in the night sky, with more and more visible under darker skies and with larger telescope apertures, each have their own story to tell. In general, a star's color correlates very well with its mass and its total lifetime, with the bluest stars representing the hottest, most massive and shortest-lived stars in the universe. Even though they contain the most fuel overall, their cores achieve incredibly high temperatures, meaning they burn through their fuel the fastest, in only a few million years instead of roughly ten billion like our sun.

Because of this, it's only the youngest of all star clusters that contain the hottest, bluest stars, and so if we want to find the most massive stars in the universe, we have to look to the largest regions of space that are actively forming them right now. In our local group of galaxies, that region doesn't belong to the giants, the Milky Way or Andromeda, but to the Large Magellanic Cloud (LMC), a small, satellite galaxy (and fourth-largest in the local group) located 170,000 light years distant.

Despite containing only one percent of the mass of our galaxy, the LMC contains the Tarantula Nebula (30 Doradus), a star-forming nebula approximately 1,000 light years in size, or roughly seven percent of the galaxy itself. You'll have to be south of the Tropic of Cancer to observe it, but if you can locate it, its center contains the super star cluster NGC 2070, holding more than 500,000 unique stars, including many hundreds of spectacular, bright blue ones. With a maximum age of two million years, the stars in this cluster are some of the youngest and most massive ever found.

At the center of NGC 2070 is a very compact concentration of stars known as R136, which is responsible for most of the light illuminating the entire Tarantula Nebula. Consisting of no less than 72 O-class and Wolf-Rayet stars within just 20 arc seconds of one another, the most massive is R136a1, with 260 times the sun's mass and a luminosity that outshines us by a factor of seven million. Since the light has to travel 170,000 light years to reach us, it's quite possible that this star has already died in a spectacular supernova, and might not even exist any longer! The next time you get a good glimpse of the southern skies, look for the most massive star in the universe, and ponder that it might not even still be alive.



Images credit: ESO/IDA/Danish 1.5 m/R. Gendler, C. C. Thöne, C. Féron, and J.-E. Ovaldsen (L), of the giant star-forming Tarantula Nebula in the Large Magellanic Cloud; NASA, ESA, and E. Sabbi (ESA/STScI), with acknowledgment to R. O'Connell (University of Virginia) and the Wide Field Camera 3 Science Oversight Committee (R), of the central merging star cluster NGC 2070, containing the enormous R136a1 at the center.

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The SDSTA Newsletter is published four times a year. The April issue (this one) is emailed to 130 paid members, and several school science departments.

The Membership year in SDSTA starts with the February conference and ends the first of February. Dues are due at each conference for member discount rates.

SDSTA members may give a one year free membership to their student teachers by submitting the student teacher's name & address.

One paid conference registration may be given to the SDSTA member that has made a submission to the newsletter (or given a presentation at the conference) and has referred at least three new members. Members may also earn a 10% finders fee for any science related ads placed in the newsletter. Our rates are $50 per page (or 3 to 4 quarter pages)

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$ 5 Student
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South Dakota Science Teachers' Association
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Calendar of Events

Homepage located at http://SDSTA.org