



**2013 Student Research Showcase
Division Award Winners**

Graduate Division

SSO4 [*Statistical Mechanics of SCOTUS*](#)

Presenter: Eddie Lee, (Princeton University)

Mentor: William Bialek, (Princeton University)

Undergraduate Division

EB15 [*Super males: Antioxidants boost male fertility and sperm viability in fruit flies*](#)

Presenter: Weily Lang, (LaGuardia Community College)

Mentor: Preethi Radhakrishnan, (LaGuardia Community College)

High School Division

BH09 [*Perception of Ambiguous Figures*](#)

Presenter: Alys Ferragamo, (St. Peter High School)

Mentor: Janine Wotton, (Gustavus Adolphus College)

And

CH01 [*An Optimal Design of Electrode Surface Morphology to Improve Water Electrolysis Efficiency*](#)

Presenter: Jaehyeong Lee, (North Carolina School of Science and Mathematics)

Mentor: Sangmin Lee, (Cree Inc.)

About Division Awards

Top (first place) winners in each research field (see Section Awards on following page) automatically move on to a second interdisciplinary round of review to determine the top high school, undergraduate and graduate presentations. In addition to the recognitions mentioned for Section Award winners, Division winners receive a small cash prize



2013 Student Research Showcase Section Award Winners

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About Section Awards

First, second and third place awards are presented to high school, undergraduate and graduate students in each field of research. Winners will receive commemorative certificates and will be featured in Sigma Xi social media and *American Scientist Magazine*. In addition, Section Award winners are invited to Associate Membership in Sigma Xi.



Graduate Division

Behavioral and Social Sciences



SSO4 [*Statistical Mechanics of SCOTUS*](#)

Presenter: Eddie Lee, (Princeton University)

Mentor: William Bialek, (Princeton University)



SS09 [*Radiographic Positive Identification: A Forensic Anthropology Approach*](#)

Presenter: Julie Fleischman, (Michigan State University)

Mentor: Todd Fenton, (Michigan State University)



SS12 [*Lost Worlds: Locating Submerged Archaeological Sites in Southeast Alaska*](#)

Presenter: Kelly Monteleone, (University of New Mexico)

Mentor: E. James Dixon, (University of New Mexico)

Biochemistry and Chemistry



CH06 [*Exploring oxygen and metals*](#)

Presenter: Margaret Scheuermann, (University of Washington)

Mentor: Karen Goldberg, (University of Washington)



CH07 [*HRnX \(X=F, Cl\) in Confinement*](#)

Presenter: Amelia Fitzsimmons, (University of Alberta)

Mentor: Mariusz Klobukowski, (University of Alberta)



CH03 [*Atomic Scale Structural Design Strategies for Artificial Polar Oxides*](#)

Presenter: Joshua Young, (Drexel University)

Mentor: James Rondinelli, (Drexel University)

Cellular & Molecular Biology



CB03 - [*The role of Osteoactivin in bone regeneration*](#) (Access Restricted Presentation)

Presenter: Gregory Sondag, Cale Crowder, Kim Novak, Fouad Moussa, Suzanne Lababidi, Samir Abdelmagid, (Northeast Ohio Medical University)

Mentor: Fayez Safadi, (Northeast Ohio Medical University)



CB18 [*How do cells make tubes during development?: Lessons from the ovary of the fruit fly*](#)

Presenter: Nathaniel Peters, (University of Washington)

Mentor: Celeste Berg, (University of Washington)



CB08 [*Detection of Mitochondrial Oxidative Stress*](#) (Access Restricted Presentation)

Presenter: Nazmiye Yapici, (Michigan Technological University)

Mentor: Lanrong Bi, (Michigan Technological University)



Graduate Division (continued)

Ecology & Evolutionary Biology



Tie

EB04 [Investigating tropical forest canopy highways](#)

Presenter: Kevin McLean, (Yale University)

Mentor: Oswald Schmitz, (Yale University)



EB07 [Why are there "lazy" ants? Explaining the occurrence of seemingly unproductive workers in social insects](#)

Presenter: Daniel Charbonneau, Anna Dornhaus (University of Arizona)

Mentor: Anna Dornhaus, (University of Arizona)



EB10 [Anchialine shrimp grazing](#)

Presenter: Justin Havird, (Auburn University)

Mentor: Scott Santos, (Auburn University)



Environmental Science

ES05 [Toxicity of Photochemically Aged Petroleum Diesel and Biodiesel](#)

Presenter: Kim Lichtveld, Seth Ebersviller (University of North Carolina at Chapel Hill)

Mentor: Harvey Jeffries, (University of North Carolina at Chapel Hill)



ES16 [Effect of the Nano-Bio Interface on the Agglomeration of Titanium Dioxide Nanoparticles: Impact on Genotoxicity, Cellular Interaction, and Cell Cycle](#)

Presenter: Raju Prasad, (University of North Carolina at Chapel Hill)

Mentor: David DeMarini, (U.S. EPA/UNC)



ES07 [Interaction of phosphonates onto the immobilized surface: Application to scale control in oil and gas flow assurance](#) (Restricted Access Presentation)

Presenter: Nan Zhang, (Rice University)

Mentor: Mason Tomson, (Rice University)



Engineering

EN14 [A Novel Total Ankle Replacement Device for Reduction and Compensation of Limb Length Discrepancies](#)

Presenter: Michael G. Harding, (Mercer University)

Mentor: Ha Vo, (Mercer University)



EN03 [Chemo-mechanical characterization of phase separated dentin adhesives](#)

Presenter: Ranganathan Parthasarathy, (University of Kansas)

Mentor: Paulette Spencer, (University of Kansas)

Tie



EN09 [Vibration Energy Harvesting: Going Beyond Idealization](#)

Presenter: Jackson Cryns, (University of Wisconsin - Madison)

Mentor: Brian Hatchell, (Pacific Northwest National Lab)

Engineering continues next page



Graduate Division (continued)

Engineering (continued)



EN07 [Stent's Effect on Flow in a Dialysis Access](#)

Presenter: Thomas Dienhart, (Marquette University)

Mentor: John LaDisa, (Marquette University)

Physics & Astronomy



PA12 [Correlating the Atomic Geometry and Electrical Properties of Graphene Nanostructures](#)
(Restricted Access Presentation)

Presenter: Zhengqing Qi, (University of Pennsylvania)

Mentor: Alan Johnson, (University of Pennsylvania)



PA09 [\$N=2\$ compactifications of M-theory to AdS3 - study through geometric algebra](#)

Presenter: Ioana Coman, (National Institute of Physics and Nuclear Engineering, Bucharest-Magurele, Romania)



PA11 [Anderson Localization: Cluster Extension of CPA via Dynamical Cluster Approximation - Typical Medium Theory](#)

Presenter: Chinedu Ekuma, (Louisiana State University)

Mentor: Mark Jarrell, (Louisiana State University)

Undergraduate Division

Behavioral and Social Sciences



SS11 [Pet Images and Intentions to Act](#)

Presenter: Katrin Haller, (Lindenwood University)

Mentor: Michiko Nohara-LeClair, (Lindenwood University)



SS06 [Effectiveness of problem-based learning activities in an undergraduate classroom](#)

Presenter: Lauren Dahlquist, (University of Nebraska at Omaha)

Mentor: Christine Cutucache, (University of Nebraska at Omaha)

Tie



BH04 [Chameleon Pattern Analysis](#)

Presenter: Megan Best, (Arizona State University)

Mentor: Kevin McGraw, (Arizona State University)

Biochemistry, Chemistry, Physiology & Immunology



PH03 [Nanoparticle Treatment for Autoimmune Disease](#) (Access Restricted Presentation)

Presenter: Walter Hsiang, Luke Hansen (Yale University)

Mentor: Michael McHugh, (Yale University)

Biochemistry, Chemistry, Physiology & Immunology (continues next page)



Undergraduate Division (continued)

Biochemistry, Chemistry, Physiology & Immunology (continued)



BC03 [Discovery of a fungal decarboxylase enzyme for biofuel applications](#)

Presenter: Victor Kang, (Yale University)

Mentor: Scott Strobel, (Yale University)



CH05 [Metalation Studies of Tetrapyrrole Macrocycles under Proposed Prebiotic Conditions](#)
(Restricted Access Presentation)

Presenter: Dana Anderson, (North Carolina State University)

Mentor: Jonathan Lindsey, (North Carolina State University)

Tie



PH01 [Ovarian Cancer and Hyperglycemia: Can Metformin be used to Halt Tumor Growth and Proliferation?](#)

Presenter: Lacey Gibson, (Southern Illinois University Carbondale)

Mentor: Buck Hales, (Southern Illinois University Carbondale)

Cellular & Molecular Biology



CB05 [Characterizing a Transcription Factor with Circadian Output](#)

Presenter: Kellen Na, (University of California, San Diego)

Mentor: Colleen Doherty, (University of California, San Diego)

Tie



CB24 [Using the novel TALEN technology for genome modification in D.melanogaster](#)

Presenter: Katarzyna Sierzputowska, (Brown University)

Mentor: Robert Reenan, (Brown University)



CB26 [Role for the GTPase hGBP-1 in Glioblastoma Prognosis](#) (Access Restricted Presentation)

Presenter: Jacob Justinger, (University of Toledo)

Mentor: Deborah Vestal, (University of Toledo)



CB04 [Cryptosporidium LAMP](#)

Presenter: Emily Wessling, (Cornell University)

Mentor: Dwight Bowman, (Cornell University: College of Veterinary Medicine)

Environmental and Geo Sciences



GS02 [A GIS Analysis of 75 Years of Channel Migration of the Little Wabash River in Clay County Southeastern-Central Illinois](#)

Presenter: William Laveau, (Eastern Illinois University)

Mentor: Diane Burns, (Eastern Illinois University)

Environmental and Geo Sciences (continues next page)



Undergraduate Division (continued)

Environmental and Geo Sciences (continued)



ES17 [Physiological Effects of Nickel Chloride Hexahydrate on Aquatic Microbial Biofilms](#)

Presenter: Desiree' Shaw, (University of Central Arkansas)

Mentor: Sally Entrekin, (University of Central Arkansas)



GS01 [A Resource Inventory of Selected Sites Adjacent to the White Clay Fault in Southwest South Dakota](#)

Presenter: Lilly Jones, (Oglala Lakota College)

Mentor: Hannan LaGarry, (Oglala Lakota College)

Ecology & Evolutionary Biology



EB15 [Super males: Antioxidants boost male fertility and sperm viability in fruit flies](#)

Presenter: Weily Lang, (LaGuardia Community College)

Mentor: Preethi Radhakrishnan, (LaGuardia Community College)



EB12 [Haplogroup Determination of Ancient Maya DNA](#)

Presenter: Michael Haynes, (SUNY Plattsburgh)

Mentor: Nancy Elwess, (SUNY Plattsburgh)



EB01 [Videoendoscope: a helpful tool in the search of Squamata in hibernation sites](#)

Presenter: Camila Kass, Nicholas Kass FCNyM-UNLP (Faculty of Natural Sciences of the National University of La Plata, Argentina)

Mentor: Jorge Williams, (Museo de La Plata)

Tie



EB13 [The Behavioral Processes Leading to Social Bonding in Canis lupus rufus](#)

Presenter: Morgan Katsarelas, (Florida State University)

Engineering, Math, Computer Science, Physics & Astronomy



EN05 [Portable Infrared Lamp Based Thermocycler](#)

Presenter: Dillon Mir, (Arizona State University)

Mentor: Antonio Garcia, (Arizona State University)



EN02 [A Living Band-Aid: Gels for Tissue Engineering](#)

Presenter: Carolina Ragolta, William Marks (Harvard University)

Mentor: Sujata Bhatia, (Harvard University)

Tie



MC05 [Coordinated Swarming using LEGO NXT Mindstorms](#)

Presenter: Maksym Stetsyuk, (Brooklyn College)

Mentor: Theodore Raphan, (Brooklyn College)



MC08 [Reign Application](#)

Presenter: Okafor Chukwuemeka, (University of Abuja, Nigeria)

Mentor: Olumide Owolabi, (University of Abuja, Nigeria)



High School Division

Behavioral and Social Sciences



BH09 [Perception of Ambiguous Figures](#)

Presenter: Alys Ferragamo, (St. Peter High School)

Mentor: Janine Wotton, (Gustavus Adolphus College)



BH08 [Importance of Color in Insect Control: Sweetpotato Weevil](#)

Presenter: Nirupa Gadi, (Conrad High School)

Mentor: Gadi Reddy, (Montana State University)



BH07 [Synesthetic Associational Patterns between Letters and Colors](#)

Presenter: Laura Herman, (Pine Crest School)

Mentor: Jordan Suchow, (Harvard University)

Biochemistry, Physiology & Immunology



Tie

BC08 [Novel Nanoparticles for Drug Delivery](#) (Access Restricted Presentation)

Presenter: Kishore Balasubramanian, (Klein Oak High School)

Mentor: Brandon Brown, (Methodist Research Institute)



PH02 [Beta-Amyloid in Neurodegenerative Diseases](#) (Access Restricted Presentation)

Presenter: Ankita Saxena, (Westmount Charter School)

Mentor: Shigeki Tsutsui, (University of Calgary)



Tie

BC04 [Protein Folding: A Biological Conundrum](#)

Presenter: Daniel Wang, (W.T. Clarke High School)

Mentor: Carlos Simmerling, (Stony Brook University)



BC06 [A Synergistic Approach in Treating Cancer via Photothermal Therapy and HSP90 Inhibition](#)

Presenter: Arjun Nair, (Webber Academy)

Mentor: David Cramb, (University of Calgary)

Chemistry



Tie

CH01 [An Optimal Design of Electrode Surface Morphology to Improve Water Electrolysis Efficiency](#)

Presenter: Jaehyeong Lee, (North Carolina School of Science and Mathematics)

Mentor: Sangmin Lee, (Cree Inc.)



CH08 [Visualization of Glucose Gradients in Water Using Raman Spectroscopy](#)

Presenter: Monica Mikkelsen, (Westtown School)

Mentor: Benjamin Greene, (Summit High School)

Chemistry (continues next page)



High School Division (continued)

Chemistry (continued)



CH12 [Development Of An Aptamer-Based MRI Contrast Agent For Thrombin Detection](#)

Presenter: Daphnée Dubouchet-Olsheski, (Elmwood School)

Mentor: Danielle Kindree, (Elmwood School)



CH13 [Impact of early transition metal-based catalysts on the performance of I-/I3- redox couples in dye-sensitized solar cells](#)

Presenters: Chris Zhen, Kavirath Jain, Maxwell Tucker (North Carolina School of Science and Mathematics)

Mentor: Myra Halpin, (North Carolina School of Science and Mathematics)

Cellular & Molecular Biology



CB19 [Rb Protein and Doxorubicin Responsiveness](#)

Presenter: Emily Ashkin, (Providence Day School)

Mentor: Bobbie Hinson, (Providence Day School)



CB27 [Cleft lip and palate: Examining variations on the ZEB1 gene](#)

Presenter: Jingwen Zhang, (Thomas Worthington High School)

Mentor: Jeff Murray, (University of Iowa)



CB28 [Early Diagnosis and Treatment of Alzheimer's: Modulating the GCLc gene to mitigate Mitochondrial Electron Transport Chain Dysfunction](#)

Presenter: Lisa Michaels, (Plano West Senior High School)

Mentor: James Michael Luchak, (Baylor College of Medicine)

Environmental Science, Ecology & Evolutionary Biology



ES11 [Mathematical Model for the Optimal Global Implementation of Residential Photovoltaic Systems](#)

Presenter: Helen Zhou, (International Academy East Campus)

Mentor: Jeff Watson, (International Academy High School)



ES01 [V. Fischeri: A Novel Solution to the Water Crisis](#)

Presenter: Megan Rosenberger, (Saint Joseph High School)

Mentor: Catherine Greco, (Saint Joseph High School)

Tie



ES09 [Differential Gene Expression in Lead-exposed Saccharomyces cerevisiae](#)

Presenter: Preksha Bhagchandani, (Pine Crest High School)

Mentor: Jennifer Gordinier, (Pine Crest High School)



ES04 [Manipulating Arsenite-Oxidizing Bacteria: A Novel Solution to the Arsenic Water Problem](#)

Presenter: Kriti Lall, (Castilleja School)

Mentor: Aru Hill, (Schmahl Science Workshops)



High School Division (continued)

Engineering, Math & Computer Science



MC01 [Using Edge Detection Algorithms for the Segmentation of Drosophila Embryo Images](#)

(Requires Google Chrome to view)

Presenter: Joseph May, (Pine Crest School)

Mentor: Jennifer Gordinier, (Pine Crest School)

Tie



MC02 [Statistical Properties of the Entropy Function of a Random Partition](#)

Presenter: Anna Movsheva, (Bronx High School of Science)

Mentor: Rostislav Matveev, (Max Planck Institute for Evolutionary Anthropology)



EN08 [In2Se3 Nanowires for Use in Solar Cells](#)

Presenter: Anna Dubovitskaya, (North Carolina School of Science and Mathematics)

Mentor: Jonathan Bennett, (North Carolina School of Science and Mathematics)

Physics & Astronomy



PA03 [Neutrinos - A New Look at the Universe](#)

Presenter: Halston Lim, Jason Liang (North Carolina School of Science and Mathematics)

Mentor: Jonathan Bennett, (North Carolina School of Science and Mathematics)



PA04 [Blast Off! Investigations in Model Rocketry](#)

Presenter: Natasha Honcharik, (Wachusett Regional High School)

Mentor: Neil Ault



PA08 [Modified Computational Methodology for Ground State and Excited States Calculations for Quartic Oscillators](#)

Presenter: Elizabeth Kim, (The Bronx High School of Science)

Mentor: Vladimir Shapovalov, (The Bronx High School of Science)