

science IMPACT

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**CARNEGIE
SCIENCE
CENTER**

One of the four Carnegie Museums of Pittsburgh



Students from diverse schools present their work at Carnegie Science's Fair's 74th annual PRSEF.

Science Fair Inspires Young Innovators

Matt Carroll, a sixth grader at St. John the Baptist School in Plum Borough, considers himself more of an athlete than a scientist. But **Carnegie Science Center's Pittsburgh Regional Science and Engineering Fair (PRSEF)** gave Carroll a chance to turn track practice into a science experiment.

Enlisting the help of his teammates, Carroll conducted his experiment on his favorite track and field event—long jump. He determined that the distance a person runs affects the distance of a jump.

In April, the 12-year-old presented his life science project to a team of judges at the 74th annual PRSEF at Heinz Field. There, he joined more than 1,030 students in grades 6-12.

Each year, PRSEF, one of the nation's

oldest, largest, and most successful science fairs, brings together the future leaders in the fields of science and technology.

More than \$1 million in cash prizes and scholarships were awarded to the top contenders. First-, second- and third-place winners also were chosen at the Junior (6th grade), Intermediate (7th and 8th grade) and Senior (9th -12th grade) levels in a range of categories, such as biology, chemistry, earth/space/environment, medicine/health/microbiology, and engineering/robotics.

Three high school students went on to represent the region at the Intel International Science and Engineering Fair (ISEF) in Phoenix. Last year, ISEF participants converged at the David L. Lawrence Convention Center in Pittsburgh for the competition. The Steel

City will host ISEF again in 2015 and 2018.

"While many science fairs have suffered from dwindling interest, PRSEF continues to grow," said **Ann Metzger**, Henry Buhl, Jr., Co-director of the Science Center. "The fair offers students the chance to present their work to representatives of the region's industrial, academic, and professional organizations – and inspires many bright and motivated young people to pursue STEM careers."

As a program of the Science Center's **Chevron Center for STEM Education and Career Development**, PRSEF is among a variety of initiatives to help ensure the next generation workforce has a strong background in STEM (science, technology, engineering, and math). PRSEF is the largest fair under the affiliation of Society for Science and the Public.

"It is the strong support of parents, teachers, and community sponsors that make the event a success year after year," says **Ron Baillie**, co-director of Carnegie Science Center.

DISCOVERING SCIENCE

This year, **Donald L. Orłowski's** 24 students from Freeport Junior and Senior High School in Sarver covered a range of topics from "Does the Geometric Shape of a Picture Frame Affect Short Term Memory?" to "Does the Mass of a Crossbow's Tip Affect Its Ability to Penetrate a Target?" Freeport Senior High School was honored with this year's award for the high school winning the most category awards.

Preparation for the competition varies from school to school, but an educator's primary role remains the same. Teachers serve as mentors, keeping students on task, helping them conduct experiments in a safe manner, and ensuring that they follow all of the rules and requirements of the competition.

"One of the major strengths of America is our creativity and ingenuity in using our

(Story continues on page 3)

directors' note



We have been following with great interest the development of the Next Generation Science Standards. The standards have been developed over many years, based on consensus research reports from the National Academies with input from recognized leaders in science, science education, higher education, and business and industry. Twenty-six “lead partner” states have been involved in the process; Pennsylvania is not one of those states, but our neighboring states – Ohio, West Virginia, New Jersey and New York – are playing leadership roles.

While it is still unclear how the standards might be implemented and assessed, they address a growing national concern about the future generation workforce in STEM (science, technology, engineering and math). It’s an issue we focus on at Carnegie Science Center through our Chevron Center for STEM Education and Career Development.

We’re encouraged that the Standards emphasize engineering, now virtually absent in U.S. classrooms. But completely missing from the standards is any mention of the affective domain related to a student’s interest in science, attitudes toward science, and career aspirations. Many research efforts have suggested that increasing student interest in learning science and improving their attitudes toward science

is essential for improving learning. That kind of understanding results from applying math and science concepts and seeing how they can be used to solve real problems. That’s what science centers do.

Kids need to be excited about learning, and they need to understand how cool science can be. And they also need to know how this “coolness” could lead to a career for them. That’s the value of science centers. Our STEM programs are designed to provide core science content with a “wow” factor, a fun way for young people to engage with science and understand the careers available to them.

It’s not clear at this writing how – or if – the Next Generation Science Standards will be implemented in our region. We do know that excellent classroom instruction in science, math, and engineering is essential – and just as critical are the engaging, exciting, and stimulating out-of-school experiences that science centers provide.

Ron Baillie and Ann Metzger
Henry Buhl., Jr., Co-Directors



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One Allegheny Avenue
Pittsburgh, Pennsylvania 15212
412.237.3400

CarnegieScienceCenter.org

Carnegie Science Center delights, educates and inspires through interactive experiences in science and technology. By making science both relevant and fun, the Science Center’s goal is to increase science literacy in the region and motivate young people to seek careers in STEM (science, technology, engineering and math).

The Science Center also serves as a town square for community dialogue on science and its social implications and seeks to showcase regional science and technology advances.

One of the four Carnegie Museums of Pittsburgh, the Science Center is Pittsburgh’s premier science exploration destination, reaching more than 700,000 people annually through its hands-on exhibits, camps, classes and off-site education programs.

Ron Baillie and Ann Metzger
Henry Buhl., Jr., Co-Directors

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Shea Minter, Shady Side Academy

Science Fair Inspires Young Innovators

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knowledge to solve problems and create inventions that make our lives better,” said Orlowski, a 7th-grade science teacher. “When students participate in science fairs, they have the opportunity to apply their knowledge, creatively solve problems, and answer questions using the scientific method.”

Shanelle Fernando, of North Allegheny Intermediate High School in McCandless, spent countless hours in a lab at Carnegie Mellon University on her project about the effects of dopamine in adult stem cells. The 9th grader’s experiment serves as a step to finding a cure for mental disorders caused by a lack of the chemical dopamine in the brain. At PRSEF, she earned scholarship awards from St. Vincent College and Mount Aloysius College for her project.

“This experience has made me change my mind about what I want to do in the future,” said Fernando, 14. “I used to think I wanted to work in the environmental field, but now I know I want to go into regenerative medicine.”

SKILLS FOR THE FUTURE

Lauren S. Talotta, currently a PRSEF judge, presented a project for the first time at PRSEF in 1996, when she was in 8th grade. Her project, “Jurassic Park – Fact or Fiction,” involved DNA extraction from various materials, including a fossilized

bison bone, to prove whether the Jurassic Park fantasy could become a reality.

“I have always told people that one of the most impactful moments in my life was **not** winning anything,” said Talotta, who didn’t place at the competition that year. “Instead of quitting, I found myself more determined to figure out where I went wrong and try again the following year.”

Talotta’s perseverance paid off. She competed throughout high school, eventually advancing to ISEF her senior year for a “Genetically Evolved Molecular Structures” computer science project.

“Volunteering to judge at PRSEF is my way of giving back to a community that gave me more than you can possibly know,” said Talotta, who served as a PRSEF volunteer for four years in college before taking on the role as co-chair of the Affiliate judges in 2005. She is one of more than 500 judges and 100 volunteers at PRSEF.

Her counterpart **Barbara Murray** can relate. Coordinator of the sponsor award judges, Murray competed at PRSEF, formerly known as the Buhl Science Fair, in 1974.

Murray won first place in Chemistry, receiving a \$25 cash prize for an experiment that compared the pH of shampoos to determine which was the least damaging to human hair.

As PRSEF judges, Talotta and Murray seek projects characterized by originality, followed by a solid oral and visual presentation by the students that displays how their research will benefit a field of study.

Shea Minter, a 10th grader at Shady Side Academy in Fox Chapel, focused on a highly topical problem—improving Internet password security. The 16-year-old conducted an experiment that proved that a person’s typing speed could be used as a variable for security authentication. A third-year PRSEF participant, Minter earned a scholarship award from Carnegie Mellon University for her work.

“If you’re proud of your project, you want to talk about it,” said Minter. “I’m learning skills that I will be able to use way beyond high school.” ■



Brad Munson, grade 11, Vincentian Academy, presents his project to judges.

Meet the STEM Leadership Team



Alana S. Kulesa, above left, Director of Strategic Education Initiatives, researches and explores potential new education programs and projects, develops concrete plans, and brings ideas to fruition. She is currently taking the lead on the Science Center's initiative to build an online directory of STEM programs. Her other projects include a Student Energy Summit for high school students, an initiative on health and the human body, and new programming that focuses on the intersections of science and literacy.

BACKGROUND

Kulesa has worked in a variety of museums and nonprofit organizations before joining the STEM team in November. Most recently, Kulesa served as the Children's Museum of Pittsburgh's youth programs manager, coordinating after-school and summer programs for middle and high school youth. She also served as executive director of AMD3 Foundation and as director of education at 3 Rivers Connect, an organization that worked with local nonprofits to improve the use of information technology to fulfill social endeavors.

“I get to be a part of the journey between imagining the possibilities and creating realities.”

KulesaA@CarnegieScienceCenter.org

John G. Radzilowicz, above center, is Carnegie Science Center's Senior Scientist, with responsibility for science content and pedagogy, educational research and evaluation, and major grant writing for all on-site and off-site offerings. In this role he serves as Principal Investigator for major Science Center projects, and oversees a wide range of programs including the offerings of the Teacher Excellence Academy of the Chevron Center for STEM Education and Career Development.

BACKGROUND

Radzilowicz originally joined the Science Center as director of the Buhl Planetarium & Observatory in 1998. The author of dozens of articles on astronomy and space science, he is a frequent public lecturer and media spokesperson science, education and their role in society. Currently, he is an adjunct faculty member in the Department of Physics and Astronomy at the University of Pittsburgh, as well as Early, Middle, and Special Education at California University of Pennsylvania.

“My role is to help define what high quality STEM Education looks like, to merge the best of informal and formal education models and best practices, and to build a local organization that can serve as a national model.”

RadzilowiczJ@CarnegieScienceCenter.org

Linda Ortenzo, above right, is the Science Center's Director of STEM Programs, overseeing program development, implementation, evaluation, fundraising, and staff for the Science Center's core STEM programs, including the Pittsburgh Regional Science & Engineering Fair and SciTech Days. She also manages the STEM Advisory Board and sponsors, which include 100 regional leaders in STEM industries, higher education, foundations, and nonprofits.

BACKGROUND

Ortenzo has 17 years' experience in informal science education spanning program and exhibition development, production, and funding. She is a frequent speaker at regional STEM education conferences and has presented at the National Science Teachers Association Conference and the Association of Science and Technology Centers Conference, an international industry organization for informal science education institutions.

“It is gratifying to have the opportunity to contribute to the imperative of effective STEM education regionally and nationally and, as a result, positively impact students' lives and society at large.”

OrtenzoL@CarnegieScienceCenter.org

BOARD SPOTLIGHT



Mike Zierden

Carnegie Science Center Board

If it were up to his two daughters, **Mike Zierden** and his family would take a trip to Carnegie Science Center every day.

“If only that were possible,” said Zierden, who serves as a vice president and product manager for Bayer MaterialScience, LLC.

Fortunately for the busy dad, Zierden has a chance to play a greater role at the Science Center by serving on the Board.

“I am at a point in my career where I am able to give back to the community,” said the Pittsburgh native. “Carnegie Science Center is a great fit with Bayer’s efforts to further science, technology, engineering, and math (STEM) education, and I am really excited to be part of the Science Center’s efforts to inspire and encourage people of all ages in the field of science.”

Zierden earned a bachelor’s degree in chemical engineering from Villanova University (Radnor, PA.) and lived in southern California for seven years before returning to Pittsburgh in 1997.

“I always tell friends who are not familiar with Pittsburgh that it has a lot of big-city attractions, but with a small-town heart,” he said. “It’s a great place to work, to live, and to raise a family.”

Not to mention, Pittsburgh is also home to the Buhl Planetarium & Observatory—Zierden’s perennial favorite parts of the Science Center.

“It really makes you think about how small we are and just how big the universe is,” he said. “It really puts things in perspective, and it amazes me every time I’m there.”

GRANTS & AWARDS

- Carnegie Science Center has raised more than \$400,000 for the **BodyTECH** initiative, which will provide engaging experiences to support the STEM curriculum for schools, while also inspiring visitors to think about their bodies in new ways. This initiative will include **BodyWORKS**, a gallery of interactive experiences and exhibits on the biology, structural engineering, and chemistry of bones, organs, blood, and brain. The total estimated cost of the BodyTECH initiative, which also includes the **BodySTAGE** live theater, **BodyLAB** health care simulation center, and **BodyFORUM** public programming, is \$3.5 million.
- Carnegie Science Center’s programs for girls were awarded Pittsburgh **Mayor Luke Ravenstahl's Citizen Service Award** “in the spirit of National Mentoring Month in January for the great work it has done in our City.” The award was presented during a Proclamation Ceremony in the City County Building in February.
- **Braskem** recently joined a list of Carnegie Science Awards sponsors with a gift of \$30,000.
- Pittsburgh Public Schools is providing \$40,000 toward summer outreach programming to bring Carnegie Science Center’s Science on the Road team to the **Summer Dreamers Academy**. This free camp engages students in grades K-8 in academic programs, activities, and special events. Science on the Road staff will bring “Wizards! Rockets! And Bugs!” to the Summer Dreamers Academy.
- A grant from **Robert M. Thompson, Jr.** and family is helping to support a new energy-themed program to be launched in October 2013. The **Student Energy Summit** will engage high school students and teachers in exploring the broad portfolio of energy options for this region in the future, and will create dialogue about current energy issues pertinent to their own lives, community, and beyond. The Student Energy Summit will feature presentations, demonstrations, and hands-on interactive workshops.



Robert Enick, honored with the Environmental Award, and Tracy Cui, Emerging Female Scientist Award.

Carnegie Science Awards Honor Local Excellence

Winners of the 2013 Carnegie Science Awards were publicly announced at a reception in late January. The awards were conferred at Carnegie Music Hall on May 3. The prestigious Chairman’s Award of the 2013 Carnegie Science Awards was awarded to three presidents of national academies who have roots in the region: Dr. **Ralph Cicerone**, of New Castle, president of the National Academy of Sciences; Dr. **Charles Vest**, of Morgantown, president of the National Academy of Engineering; and Dr. **Harvey Fineberg**, of Pittsburgh, president of the Institute of Medicine.

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Duquesne Light Conservation Day Breaks Record

For the sixth year in a row, Carnegie Science Center provided a free day for the public in honor of Martin Luther King, Jr. Day on Jan. 21. General admission, parking, and the *Coral Reef Adventure* Omnimax film were provided free of charge through a sponsorship from Duquesne Light. A record-breaking 6,313 visitors attended that day.

Future City Competition

The regional Future City Competition took place in January, attracting students from 24 middle schools. Each team created a city displaying residential, commercial, and industrial areas, power plants, transportation systems, and communication systems to address important issues such as pollution, traffic density, taxes, and budgets. The winning team, from **St. Bede School** in Point Breeze, received a trip to Washington, D.C. to compete in the national finals during National Engineers Week in February. Other honors included Propel Braddock Middle School in the best new school category. Carnegie Science Center hired an AmeriCorps member to mentor the Propel Braddock team as part of the Science Center's effort to increase participation of underserved students in STEM programs and competitions.

Electric Vehicle Charging Station

Courtesy of the **Eaton Corporation**, a charging station for electric vehicles is now conveniently located in the Science Center's front parking lot. Driving electric vehicles helps to reduce greenhouse gas emissions. According to the U.S. Department of Energy, electric vehicles are three times as energy-efficient as gasoline-powered cars. About 60% of the energy put into electric vehicles is converted to power at the wheels, but only about 20% in gasoline engines.

PARTNER SPOTLIGHT



Sylvie Tran

Development Manager of Shell Oil Company

Sylvie Tran, a development manager for the Shell Oil Company, is a Harvard Business School graduate. In her current position, she is part of the leadership team that managed the post-acquisition integration of East Resources, a company Shell bought in July 2010. She is also leading the geoscience and engineering teams focused on designing and implementing development plans for shale plays in the area. Tran's career has taken her across the globe. She worked as a drilling engineer in Canada, a consultant in France, a senior engineer in Algeria, and field engineer, operations supervisor, and project leader in Australia. Prior to her current role, Tran served as a development manager in western Canada, overseeing natural gas assets.

About Shell Oil Company:

Shell's Marcellus Shale operations are focused in Tioga, Lawrence, and Butler counties with exploration activities in Mercer, Warren, McKean, Forest, and Elk Counties. Shell's upstream operations in Appalachia are headquartered in Sewickley, Pa. Shell has more than 300 employees located throughout Pennsylvania. Shell owns or leases more than 900,000 gross acres of Marcellus rights in the Appalachian Basin.

On the importance of Shell's partnership with the Science Center:

Shell is delighted to be a sponsoring partner of Carnegie Science Center. An enormous amount of science and technology underpins our business. In order to remain the most innovative oil and gas company in our industry, Shell seeks to invest in future generations, through partners like Carnegie Science Center, to help foster an appreciation and understanding of what science and technology fields have to offer.

In what ways has Shell supported the Science Center?

Shell has supported the Science Center in a number of ways via a \$300,000 contribution. Programs supported through this grant include a database of regional STEM programs, a new Teacher Excellence Academy, Sci-Tech Days, the Pittsburgh Regional Science & Engineering Fair, and the Science Center's digital learning initiative, which involves the purchase of tablets and other educational materials. □

STEM jobs nationally in the past 10 years have grown at three times the pace of non-STEM jobs.



Spring SciTech Days at the Science Center

More than 3,200 middle and high school students attended **SciTech Days** in March, which featured more than 250 exhibits by companies and universities, demonstration theater presentations, and hands-on workshops on the region's growth areas throughout the four-day event in March. Nearly 1,300 students from underserved schools participated in the event. Exhibits highlighted the growth areas of Pittsburgh, including biotechnology, robotics, advanced materials processes, environmental technology, and nanotechnology.

SciTech activities continued for an additional day for the general public in celebration of **Math + Science = Success SciTech Day**, held in conjunction with the **Math + Science = Success** public awareness campaign. The Science Center is partnering with the **Math & Science Collaborative** and **WTAE 4** to launch the campaign, sponsored by **FedEx Ground**, which aims to encourage students to enroll in higher level math and science courses.

Visitors had a chance to meet **WTAE Weather Watch 4** meteorologists **Mike Harvey** and **Ray Petelin** at the Science Center's Weather Station for photo and autograph opportunities. ■



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Engineer The Future

Carnegie Science Center hosted **Engineer the Future** in celebration of the science of engineering and the region's achievements and advances in architecture, building, and construction. More than 500 engineers from local and national agencies, societies, and universities participated in the two-day event, held each February, in observance of **National Engineers Week**. Visitors created their own Super Ball with American Institute of Chemical Engineers; built and created robots using LEGO® Mindstorms® with University of Pittsburgh School of Engineering; and learned how to convert recyclables into new products with Carnegie Mellon University's Department of Chemical Engineering. More than 4,300 visitors attended.

SpaceOut! Astronomy Weekend

Carnegie Science Center's **SpaceOut! Astronomy Weekend** in March featured science demonstrations, special presentations by experts in the field, and hands-on activities for stargazers of all ages.

Buhl Planetarium & Observatory staff, members of the Amateur Astronomers Association of Pittsburgh (AAP), Kiski Astronomers, and the Tripoli Rocket Association hosted dozens of tables and activities, including a rocket launch, crater drop, solar system displays, amateur telescope making, and NASA's Educational Resource Center. Make-and-take crafts over the two-day event included sundials, star clocks, comets, and "Mars soil". Visitors also observed meteorites and Moon rocks, made their own planet cookies, and listened to experts in the field. Among the presenters were **Dr. Jaya Bajpayee** of NASA's Goddard Space Flight Center, who talked about the future of space flight, and **Dr. Andrew Zentner**, University of Pittsburgh, who explored the mysteries of the universe.



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Visitors make their own thermometers at one of the activity stations, created by Cal U students.

StormFest: A Festival of the Geosciences

More than 5,200 visitors discovered the science behind weather and other natural phenomena at StormFest in February. Carnegie Science Center's annual educational outreach event is hosted in partnership with **California University of Pennsylvania's Southwestern Pennsylvania Chapter of the American Meteorological Society**. Hands-on activity stations are designed and presented by Cal U students who are currently majoring in geology, geographic information

systems, mathematics, and education. Cal U students also recruited volunteers from Ohio University to assist at the event. During the two-day event, visitors learned how to make rocks, lava lamps, rain sticks, and "glurch," a substance that has both solid and liquid properties. Other StormFest favorites include a tornado in a jar, a raindrop experiment, and tutorials on how to make a weather map, pinwheel, and thermometer. ■