



GooddardView

John Mather: The Path to a Nobel Prize

Pg 3

Emilie Drobnes: An Event Innovator

Pg 5

Explorer Program Directly Engages Classroom Students

Pg 6

Goddard Education: A Letter from Bob Gabrys



Dr. Bob Gabrys

When NASA accepted the challenge to explore space, it also made a commitment to influence our youth and to explore higher achievement in Science, Technology, Engineering, and Mathematics

(STEM) education. Almost 50 years later, NASA's educational motto, "To see learning in a whole new light," propels the Agency's effort to inspire and engage the next generation of explorers. The goal is to ensure a path so others may follow in the footsteps of pioneers such as John Glenn, Neil Armstrong, and Barbara Morgan.

The Goddard education staff works daily within this framework offering educational opportunities designed to inspire, engage, educate, and employ our next generation of space explorers. We are also aware of a potential pool of future space explorers that includes friends and family members of our Goddard community.

This special *all* education edition of the *Goddard View* will hopefully alert you to the many educational initiatives and opportunities at Goddard. In this issue, we have included Agency-sponsored programs, as well as several unique Goddard education efforts. We have an inspiring story about the early education years of a Goddard community member who has brought home the gold—a Nobel Prize in physics. There is also recognition of the efforts and loss of one of our own champion for kids within our robotics community.

It is impossible to explain each of our education programs here as we are constantly reevaluating and updating our programs to keep in line with new technology, ideas, and the educational needs of the community. The Goddard education staff is here to support the formal and informal educational efforts of the Goddard community and our neighbors throughout the northeastern United States. We also want to solicit your help in engaging and inspiring the next generation by volunteering your time in support of Goddard's educational outreach efforts. Together we can engage and inspire today's students to become tomorrow's explorers to the 'Moon, Mars, and Beyond.'

Regards,

Dr. Robert Gabrys
Goddard Chief Education Officer

For a full listing of the educational opportunities at Goddard, please visit the Goddard Education Web site at: <http://education.gsfc.nasa.gov/>.



Table of Contents

[GoddardUpdates](#)

Goddard Education: A Letter from Bob Gabrys - 2

John Mather: The Path to a Nobel Prize - 3

Internships to Inspire the Next Generation - 4

Emilie Drobnes: An Event Innovator - 5

Explorer Program Directly Engages Classroom Students - 6

[In Memoriam](#)

Mike Wade - 8

Cover Student from Anna Howard Shaw Middle School, Philadelphia, Pa., showing enthusiasm during a NASA Explorer School event

Image credit Chris Gunn

GoddardView Info

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John Mather: The Path to a Nobel Prize

By Amy Pruett



Photo credit: NASA

Caption: Dr. John Mather greeting the next generation of scientists and engineers.

Once Dr. John Mather received the Nobel Prize for Physics, he became a Goddard celebrity. Of course, like most famous persons, John acknowledges his recognition, but humbly reiterates that several important factors led him to his greatest achievement.

Science has always been at the center of John's life. John comes from a line of science enthusiasts and contributors to significant discoveries. His maternal grandfather was a bacteriologist with Abbott Laboratories and contributed to the development of penicillin. John's father had a Ph.D. in animal husbandry and statistics, specializing in dairy cattle breeding and feeding. He was indirectly responsible for the re-optimization of the dairy industry, which led to the production of more protein and less butter.

Growing up in a home located on the grounds of the Dairy Research Station in Sussex County, New Jersey, his close connection to research tools, from birth to age 18, certainly had an influence on John.

Because of the close proximity of the Mather family home to his job, John's father never really left the office. John's bedtime stories included tales of the relationship between cells, chromosomes, genes, and inheritance, and evening entertainment sometimes consisted of his parents reading biographies of Darwin and Galileo. From the beginning, John's world was highly influenced by science.

In his first years of elementary school, John developed a strong interest in science and learning. "I didn't really appreciate what science was about, but it sounded very exciting," said John.

Reading proved to be a far more rewarding hobby to him than the hobbies of his classmates. He spent class time reading books he'd hide in his desk, uninterested in the elementary lessons.

Only a few years later, he realized that science was his passion. "By the time I was in fourth grade, I was already pretty sure I liked scientific and engineering related things, including electronics," recounts John.

A one-tube radio kit and a five-tube shortwave Heathkit radio became his favorite toys. At age nine, he began his first research projects consisting of four science fair projects.

Perhaps influenced by his father's professional goal to improve dairy cattle, John investigated dietary influence on rats' activity levels for a science project. He fed eight rats a variety of diets and monitored their behavior.

A professional scientist in the making, he learned from his dad how to populate a Greco-Latin square for statistical analysis and found some very interesting results. "The answer: dog food and vitamins is a good diet for rats, and corn flakes alone are totally inadequate," said John.

In high school, John found that his love of science and mathematics was unique. At Newton High School, he recalls he had some excellent teachers in science, math, and English, and they encouraged his desire for extracurricular study.

When John's father took a summer course in calculus and brought his textbook home, John used it to learn advanced placement (AP) calculus by himself.

By the time John was in high school, the advent of the Space Age convinced America of the importance of developing world-class scientists and mathematicians. Along with an increased emphasis in science and mathematics in the school systems, additional informal science education opportunities were developed. In elementary school, John went to two summer camps that featured science, and in high school, he attended summer schools at Assumption College and Cornell University.

John recalls the significance of the Cornell University summer physics program funded by the National Science Foundation. He enrolled after the eleventh grade and it introduced him to quantum mechanics, special relativity, optics, nuclear physics, and cosmology.

"Coming back from these programs, having done fairly well, I was convinced that I could have a future in science, and I was very glad to have a head start relative to others of my age," said John.

[Continued on page 4](#)

Internships to Inspire the Next Generation

By Dewayne Washington

Each year, Goddard opens its gates to several hundred of this country's best and brightest students to see up close the world renowned work accomplished here. The Goddard internship programs provide opportunities for middle school through graduate level students to engage in the premier research of this planet and beyond.

One such program, Summer Institute in Science, Technology, Engineering, and Research (SISTER) invites a select group of talented eighth grade girls to Goddard. Participants observe and experience real hands-on project research such as learning how to build the *Hubble* telescope. "The week is structured to expose the girls to as much as possible and still have fun," said Terri Patterson, SISTER Program Coordinator.

For high school students, the High School Internship Program (HIP) allows participants to explore 'real time' applications of science, technology, engineering, and mathematics (STEM) disciplines. The students conduct real research and are guided by Goddard mentors. "HIP allows students real-work exposure and will hopefully inspire their career choice prior to entering college," said Dillard Menchan, Deputy Chief of Education for Goddard.

The Goddard education office also partners with colleges and universities to provide learning opportunities as well. Last summer, the Summer Institute for Robotics (SIR) program sponsored by Morgan State University completed its inaugural year. The program was created to increase minority high school students' knowledge and understanding of the concepts and principles of robotic systems.

The Summer Institute in Engineering and Computer Applications (SIECA) program administered by Bowie State University is Goddard's oldest, continuous summer program. "It has also been the most successful 'pipeline' feeder to our permanent work force," said Menchan. The experience allows undergraduate students the opportunity to work on existing NASA projects with scientists and engineers.

Other university partnerships include the University of Maryland, Morehouse College, Spellman College, the University of Puerto Rico, and Florida Agricultural and Mechanical (A&M) University. "My experience allowed me to see one aspect of engineering, and in turn, shaped my idea of what I want to do with my degree," said Kelly Meyers, a former intern participant.

Goddard is also home to one of four unique and exciting residential internship programs targeting college juniors and seniors or first-year graduate students. These students have expressed an interest in NASA's space programs and are recognized as having the potential to become future leaders. Upon completion, students are inducted into the NASA Academy Alumni Association and also earn credits from the University of Maryland.

"NASA's space program is just about the greatest show on Earth if you are a technical person and having these young eager people with fresh points-of-view and questions is good for Goddard as well as NASA," says Dr. Vigdor Teplitz, Chief of Higher Education for Goddard.

For more details and a complete listing of Goddard's internship programs please visit the Education Web site at: <http://education.gsfc.nasa.gov/>.

John Mather: The Path to a Nobel Prize

Continued from Page 3

After high school graduation, John had the pick of six colleges, and after selecting Swarthmore college in Pennsylvania and packing his bags, he was reminded that he was a big fish in a small pond, and he would not always be the uncontested prodigy.

After a highly successful undergraduate career, John went right into a graduate program at Berkley. While the Vietnam War and the Peoples' Park demonstrations of the 1960s and early 1970s were at their height, he stayed out of trouble. John's poor eyesight made him ineligible for the draft, and he put his energy to work in laboratories and focused on his courses.

In 1970, John started his Ph.D. thesis work, which would be the foundation for the COsmic Background Explorer (COBE) satellite project. However, the Earth's atmosphere and engineering complications that led to an unsuccessful first flight of a balloon payload left him with fairly inconclusive results. After receiving his doctorate, John left California for New York's Goddard Institute for Space Studies. After several months, NASA's Announcement of Opportunity 6 and 7 for Scout and Delta-launched satellite missions renewed John's interest in his thesis work.

"My optimism was returning, and when Pat Thaddeus, my postdoctoral advisor at the Goddard Institute for Space Studies (GISS) asked for ideas, I cheerfully asserted that my thesis experiment would have worked a lot better in space," said John.

In the fall of 1976, NASA appointed the Science Definition Team for the COBE satellite project, which included John, of course. He was correct, his thesis experiment really did work better in space.

John Mather's life is an inspirational one. Based on the foundation he received from his parents, the support of his schools, and the summer programs inspired by the Space Race, at the age of 28 he initiated work that led to one of the most significant discoveries in history, and made him Goddard's, first Nobel Prize Winner. ■

Emilie Drobnes: An Event Innovator

By Amy Pruett

Emilie Drobnes proves science isn't drab. At one of her Solar Dynamic Observatory (SDO) events, you'll see children chasing homemade hovercrafts, jumping with rockets powered by Alka-Seltzer and water, and throwing paper helicopters.

An event innovator, Emilie Drobnes, the SDO Lead for Education and Public Outreach, creates stimulating education events with science themes that also contain life lessons.

While Emilie has organized many events in her SDO role, her pride and joy has been the Family Science Night series. In its second year, it brings back 12 to 13 families each month for hands-on activities that lead to scientific self-discovery.

Each month's installment of Family Science Night features a different scientific subject, but Emilie has the same two goals for each.

First, Emilie strives to make science tangible. "Science is such a big part of our everyday lives, but people don't often realize this. . . . What I can do is help people see that science is fun and all around us. Every time they use a microwave, drive a car, play their video game, they are actually doing science," said Emilie.

Once there is a realization that science is at everyone's fingertips, she believes a change occurs. "Basically, the idea is to change their perception. The event may not increase their scientific knowledge, it may not even lead them to careers in science, however, it going to change their idea of what science is and what a scientist does."

The second goal of each of Emilie's events is to develop critical thinkers, one child and parent at a time. "We need to have a society of conscious people that can see a problem and find a solution," said Emilie. "I mean it's the same approach, we are all actually doing science every time we problem solve and if we don't know how to do that we won't find that original solution or design that new invention, it applies on so many levels."

Emilie believes the only way a society advances is through critical thinking. To achieve her goals, Emilie ensures that there are a slew of questions and hands-on activities at each event.

During training for facilitators of Family Science Night, she constantly reiterates that their job is to answer with additional questions.

When parents and their children are not immediately provided answers to their questions, it challenges them to think for themselves and work together, pooling their current understanding.

The hands-on activities then facilitate learning through experience. The use of everyday examples proves that science is prevalent in every day life. All throughout the process, questions lead the way to increased knowledge.



Caption: Emilie Drobnes leads student participants in a modeling activity at Family Science Night.

Photo credit: Pat Izzo

Emilie uses her successful Family Science Night as a model for other informal education opportunities sponsored by Goddard missions. Currently, she assists the Goddard Visitor Center in their Sunday Experiment series, which was implemented in September. Held the third Sunday of every month at the Goddard Visitor Center, the program targets local families and features new hands-on activities that connect to Goddard science. Each month

will focus on a specific Goddard science, technology, engineering, or mathematics (STEM) theme.

Through Emilie's innovative events, she introduces science as an exciting, important part of everyday life and also facilitates the development of important skills such as critical thinking. She hopes to inspire other missions and projects to follow her successful model and expand Goddard's realm of positive influence.

For additional information on the Family Science Night, which occurs the third Thursday of each month at the Visitor Center, please visit: <http://sdoepo.gsfc.nasa.gov/family/family.php>

For additional information on the Sunday Experiment, please visit: <http://sdoepo.gsfc.nasa.gov/family/sunday.php>



Explorer Program Directly Engages Classroom Students

By Dewayne Washington

Four years ago, the NASA Explorer School (NES) Program was launched in a continuing effort to inspire the next generation of explorers as only NASA can. Today, the NES acceptance list consists of more than 175 schools and 70,000 students from across our great nation.

Goddard has been responsible for providing support to 25 NES locations within the northeast region of the United States. During this time, Goddard educators have engaged students with up to 60 hours of direct classroom influence about the unique science and technology that is NASA Goddard.

"The NASA Explorer School Program provides schools with classroom resources and innovative technology based on NASA's missions and discoveries," says Trena Ferrell, Goddard Explorer School Coordinator. "During the three-year partnership, NASA helps schools address science, technology, engineering, and mathematics (STEM) needs."

The NES program provides each participating school with professional development, stipends, grants, and curricular supports. Resource support also includes the connecting of each school to the NASA Digital Learning Network (DLN). This technology has allowed Goddard scientists and engineers to talk to students in their classroom. Using this, Barbara Morgan was able to answer student questions during her flight aboard STS-118.

Schools are also assisted in developing and maintaining partnerships with state and corporate partners to sustain resources support beyond the three-year NASA partnership. The most recent reports have shown that students are excited, feel empowered, and are actually engaged.

"The NES project has helped me to reach a broader scope of students, even those not previously interested in science," says Jessica Sylvia, a 6th grade teacher in Massachusetts. "Learning how important and relevant the engagement of each individual is has helped me grow as an educator."

Within the coming weeks, NES kickoff events will be held in celebration of the 25 schools selected for the 2007–2008 school year, 3 are within the Goddard region. These events provide an opportunity for NASA personnel to inspire and engage teachers, students, parents, and friends about their three-year partnership with NASA.

"These events are great fun and rewarding for all involved," says Ferrell. "What a great way to influence our next generation through fun and excitement for the work and science we accomplish today. We also hope to inspire them to become tomorrow's explorers."

Each year, NASA solicits applications from schools across the country to apply online for an opportunity to partner with NASA and 'See learning in a whole new light.' For more information about the NES program in the Goddard region, contact Trena Ferrell at 301-286-9211.

You can also visit the NES Web site at: <http://explorerschools.nasa.gov>.

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Caption: Shuttle Pilot Chris Ferguson
Photo Credit: Chris Gunn

"The most recent reports have shown that students are excited, feel empowered, and are actually engaged."

Explorer Program Directly Engages Classroom Students



Photo credit: Chris Gunn

Caption: Former Space Station Science Officer Donald Pettit engages Ann Beers Elementary School students in Washington, D.C.



Photo credit: Chris Gunn

Caption: Shuttle Pilot Chris Ferguson engages students at the NASA Explorer School in Philadelphia.



Photo credit: Chris Gunn

Caption: Dillard Menchan, Deputy Chief Goddard Education Office, talks to faculty at Anna Howard Shaw Middle School.



Photo credit: Chris Gunn

Caption: Emilie Drobnes leads student participants.

In Memoriam: Mike Wade

By Dewayne Washington

Michael Wade, Senior Aerospace Engineer Technician in the Advanced Manufacturing Branch, died of a massive heart attack at age 53 during the night of May 12, 2007 while visiting his mother and sister in Ohio.

Inside the gates of Goddard, Mike was known as a great friend, teacher, mentor, and innovator. He began working here in 1992, quickly establishing himself as reliable, thorough, and skilled. "Mike's machining skills, expertise, technical ability, and enthusiasm quickly identified Mike as a leader and senior technician," says Stephen Simonds, Sr., Associate Branch Head and Mike's friend. According to Simonds, Mike's work in technology advances resulted in two U.S. patents.

Mike was also recognized by his colleagues as a team player and teacher. "Everyone I know of loved working with Mike and considered him a great teacher," says Peter Baltzell, a co-worker. Mike led various flight and nonflight assemblies and was recruited by Montgomery College to teach future technicians.

Outside the Goddard gates, Mike was known internationally as a champion for kids.

More than 12 years ago, he was given the additional duty of representing Goddard and providing support for the For Inspiration and Recognition of Science and Technology (FIRST) program. "Mike was given instructions to 'make it grow' and he did just that," insists Simonds. Over the years, Mike talked to everyone about FIRST: school staff, boards of education members, elected officials, management members of corporations, and anyone else who would listen.

"Mike was always for the kids," says Baltzell, who spent time on the road with Mike in support of FIRST. "Because of Mike, I got involved with the program and it has been a great experience for me."

Mike was instrumental in starting the local FIRST regional, The Chesapeake; he also supported various robotic teams and conducted off-season events. He created and operated the traveling NASA machine shop and portable arenas for FIRST events throughout the country.

In 2004, Mike was recognized by FIRST for his dedication when he received the Volunteer of the Year Award at the Chesapeake Regional. "To me, the greatest FIRST accomplishment is watching the faces of the students as they compete at the U.S. Naval Academy's Halsey Field with their champion robot," said Mike when honored. In 2005, the seasoned FIRST veteran and do-it-all mentor was again recognized with the Unsung FIRST Heroes Award.



According to Simonds, Mike will be remembered for generating enthusiasm and interest in engineering and altering the career aspirations of students who could potentially become our exploring pioneers of tomorrow. "Mike always valued education and maybe he was hoping that the kids would have as good a life as he did," Baltzell suggests.

Mike leaves behind wife, Sherry Wade; son, Michael James Wade Jr.; daughter, Jennifer Spampinato; mother, Gladys Lilley Wade; sister, Jill Baer; and grandson, Vincent Michael Spampinato. ■

Photo Credit: All photos taken by Chris Gunn