



George De Boer and Jo Ellen Roseman of Project 2061, which is named for the return of Halley's Comet, a nod to the program's long-term focus.

## Before the Common Core, There Was *Science for All Americans*

The landmark AAAS book continues to influence education reform 25 years after it defined the concept of science literacy.

By **Kathy Wren**

**M**any of the debates swirling around states' adoption of the Common Core State Standards and the Next Generation Science Standards have a distinctly 21st-century feel. But at the heart of these efforts lies an ambitious AAAS book published 25 years ago that was the first to articulate what the next generation should know and be able to do in science, mathematics, and technology.

Today, education experts agree that *Science for All Americans*—a 3-year collaboration among hundreds of scientists, mathematicians, and other scholars—has had a significant impact on science education reform, by helping to define the concept of science literacy and lay the groundwork for national

education standards in science, technology, engineering, and mathematics (STEM).

More than 40 states and the District of Columbia have now adopted the Common Core standards for math and English, and 12 states plus the District have adopted the Next Generation Science Standards. A nationwide consensus on whether these standards will significantly improve STEM education remains elusive, but many educators and other STEM experts nonetheless embrace the idea of a set of shared goals to guide the teaching of all U.S. students. Such a vision was initially laid out in 1989, when AAAS' Project 2061 published *Science for All Americans*.

"It's often forgotten, but it's this book that got it all going and just pervades everything else," said George De Boer, deputy director of Project 2061.

*Science for All Americans* was the first major publication from Project 2061, then a fledgling program headed by James Rutherford, former assistant director of the National Science Foundation and assistant secretary of education at the U.S. Department of Education. At the time, federal enthusiasm for improving STEM education, which had spiked after the Soviet Union's launch of the Sputnik satellite, had waned. And Rutherford felt he had seen too many education reform efforts fail to achieve a lasting impact.

"That's when it occurred to me that what was wrong with our whole approach was that it was too short term," Rutherford said. "We're a big, complicated country. It's going to take time to turn things around. I decided we needed to have some kind of statement saying, 'Here are the understandings and skills of science that we'd like all people to have.'"

In the last two decades, the National Research Council and other organizations have also developed STEM education standards. But, it was *Science for All Americans* that first marked a clear departure from the previous era, according to Jo Ellen Roseman, director of Project 2061.

“The post-Sputnik science education reform was really about preparing the next generation of scientists,” she said. “*Science for All Americans* took a new position on science literacy, which was that everyone needs some level of science knowledge and habits of mind so that when reading about a scientific report in the newspaper, for example, one would think about it in a more critical way.”

To launch the project, Rutherford and his associate director, Andrew “Chick” Ahlgren, convened panels of scientists, mathematicians, engineers, physicians, philosophers, historians, and educators, and tasked them with identifying the most important STEM concepts for students to master by the time they graduated high school.

These discussions formed the basis for *Science for All Americans*, which emphasized the interdependence of STEM fields, the importance of key concepts and principles of science, the diversity and unity of the natural world, and the need to use scientific knowledge and ways of thinking to benefit the individual and society.

The book was followed 4 years later by the AAAS report *Benchmarks for Science Literacy*, which specifies how students should progress toward these goals as they move through successive grade levels.

“What James Rutherford and Chick Ahlgren did was pare things down and focus the content on the really big ideas. The second thing they did was use language that was very clear and not overly technical,” said Rodger Bybee, a writing team leader for the Next Generation Science Standards. “Those are the types of things that we also tried to do in the new standards.”

“I especially liked the theme in *Science for All Americans* that less detail and rote memorization is better,” said Gil Omenn, who was a member of the initial Project 2061 council and is now a professor of internal medicine, human genetics, and public health at the University of Michigan and the director of the UM Center for Computational Medicine & Bioinformatics. Omenn, who also served as AAAS president, noted that Project 2061 continued in this direction with a series of textbook evaluations that helped publishers reduce jargon and introduce terms more meaningfully.

Today, Project 2061 is helping teachers implement the Next Generation Science Standards through workshops that offer tools, resources, and strategies based on *Science for All Americans*, *Benchmarks for Science Literacy*, and the related *Atlas of Science Literacy*. ■

# Brain Signaling May Be Next Target of Autism Treatment

In a break with tradition, researchers look to reverse the disorder’s neurological causes.

By Earl Lane

Experts agree that early behavioral intervention is the preferred first line of treatment for autism, but some speakers at a recent Capitol Hill briefing suggested that drugs that affect brain signaling may be among future therapies.

The traditional view has been that drug treatments cannot change or cure autism’s underlying neurological disorder, said Diane Chugani, professor of pediatrics at Wayne State University and director of the Translational Imaging Laboratory at Children’s Hospital of Michigan in Detroit. However, animal studies suggest that there may be ways to reverse neurological deficits associated with autism-related disorders such as Rett syndrome and tuberous sclerosis complex, she said, and there could be common neurochemical features associated with many genes implicated in autism.

Chugani and other scientists discussed advances in the diagnosis and treatment of autism spectrum disorder (ASD) at a well-attended 17 July briefing, which drew about 50 congressional staffers and members of the public. The briefing was hosted by AAAS through the support of the Dana Foundation in conjunction with Rep. Chaka Fattah (D-Pa.).

Future ASD drugs might target the neurochemical messengers that are released at the brain’s synapses, the small gaps at the ends of neighboring neurons where signals are transmitted from one cell to another. Chugani has done positron emission tomography (PET) studies of serotonin synthesis in children with autism and has found differences in developmental changes in

serotonin synthesis in the brains of young autistic children compared to nonautistic children. Based upon these results, she and her colleagues conducted a clinical trial on a drug called buspirone that mimics serotonin in young autistic children, and are pursuing further testing on its effects.

The emerging understanding of how genetic variability affects the synapses and communication among brain cells should prove to be “a rich source of new drug treatments for ASD,” Chugani said. She predicted that

genetic testing, use of biomarkers in the blood, and brain imaging methods will help clinicians determine which treatments are most appropriate for individuals with autism at different stages of their development. “I think we are on the threshold of some very interesting results,” Chugani said.

Catherine Lord, director of the Center for Autism and the Developing Brain at New York-Presbyterian Hospital, Weill Cornell Medical College and Columbia University

Medical Center, was more guarded in her outlook. “We don’t have any biological markers,” she said. “We have a lively, interesting, wonderful background of neuroscience that is moving forward, but it has basically had no practical result, I would say, in the last 20 years.”

Chugani said that early use of intensive behavioral therapy remains the current standard of care and must be made available to all children with autism spectrum disorders. There remains a need for faster, more effective screening of children, according to Lord, and active, early involvement by parents is essential. “We can do a very good job” of diagnosis, she said, but it requires time and input from both the parents and skilled clinicians. ■



More public awareness and better diagnoses may partly explain the recent increase in autism cases, said Catherine Lord.

## AAAS Annual Election: Preliminary Announcement

The 2014 AAAS election of general and section officers is scheduled to begin in October. All members will receive a ballot for election of the president-elect, members of the Board of Directors, and members of the Committee on Nominations. Members registered in sections will receive ballots for elections for each section (up to three) they are enrolled in.

Candidates for section elections are listed below. Candidates for the general election will appear in the September issue of News & Notes. Additional names may be placed in nomination for any office by petition submitted to the Chief Executive Officer no

later than 24 September 2014. Petitions nominating candidates for president-elect, members of the Board, or members of the Committee on Nominations must bear the signatures of at least 100 members of the association. Petitions nominating candidates for any section office must bear the signatures of at least 50 members of the section. A petition to place an additional name in nomination for any office must be accompanied by the nominee's curriculum vitae and statement of acceptance of nomination. Biographical information for the following candidates will be enclosed with the ballots sent to members. ■

### SECTION ELECTIONS

#### Agriculture, Food, and Renewable Resources

*Chair Elect:* Steven C. Huber, Univ. of Illinois at Urbana-Champaign; Harry J. Klee, Univ. of Florida

*Member-at-Large of the Section Committee:* Blake C. Meyers, Univ. of Delaware; Johanna Schmitt, Univ. of California, Davis

*Electorate Nominating Committee:* Lisa Durso, USDA-ARS; Peggy Ozias-Akins, Univ. of Georgia; Amanda D. Rodewald, Cornell Univ.; Roger Philip Wise, USDA-ARS/Iowa State Univ.

*Council Delegate:* Jim Giovannoni, USDA-ARS/Cornell Univ.; Neelima Roy Sinha, Univ. of California, Davis

#### Anthropology

*Chair Elect:* Steven R. Leigh, Univ. of Colorado Boulder; Dennis H. O'Rourke, Univ. of Utah

*Member-at-Large of the Section Committee:* Joanna E. Lambert, Univ. of Texas at San Antonio; Dawnie Wolfe Steadman, Univ. of Tennessee, Knoxville

*Electorate Nominating Committee:* Yolanda T. Moses, Univ. of California, Riverside; Peter Neal Peregrine, Lawrence Univ.; J. Josh Snodgrass, Univ. of Oregon; Anne C. Stone, Arizona State Univ.

#### Astronomy

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*Electorate Nominating Committee:* Harriet L. Dinerstein, Univ. of Texas at Austin; Steven M. Kahn, Stanford Univ.; Nancy A. Levenson, Gemini Observatory; Sylvain Veilleux, Univ. of Maryland, College Park

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#### Biological Sciences

*Chair Elect:* Pamela C. Ronald, Univ. of California, Davis; Venkatesan Sundaresan, Univ. of California, Davis

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#### Dentistry and Oral Health Sciences

*Chair Elect:* Jacques E. Nör, Univ. of Michigan; Susan Reisine, Univ. of Connecticut

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#### Geology and Geography

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# Science

## AAAS news and notes

*Science* **345** (6200), 1012-1015.  
DOI: 10.1126/science.345.6200.1012

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