Sigma Xi Today

JULY/AUGUST 2001 · VOLUME 10, NUMBER 4

Venter Receives Common Wealth Award

Biochemist, entrepreneur and gene pioneer J. Craig Venter received the 2001 Common Wealth Award for Science and Invention in April.

Administered by PNC Bank of Delaware and first presented in 1979, the five annual Common Wealth Awards honor individuals who have enriched and advanced humanity through exceptional lifetime achievements.

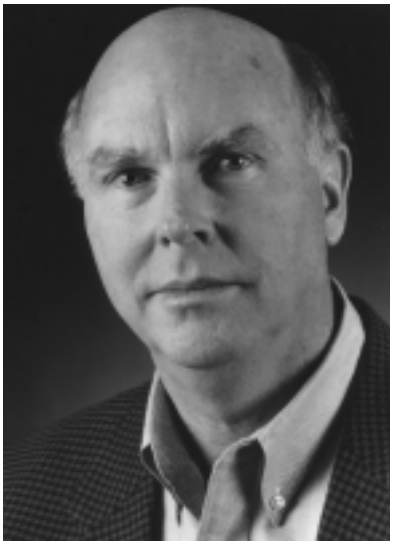
Sigma Xi nominates the recipient of the science and invention award. The other categories include the dramatic arts, mass communications, literature and public service. Each award carries a prize of $50,000.

CEO of Celera Genomics, Venter earned the grudging respect of even his most outspoken critics last year when Celera announced its success in deciphering virtually all of the human genome. Many had scoffed at his brash claim two years earlier that Celera would accomplish this feat in three years at a cost of less than $300 million.

Competition with Venter's group spurred the federally-financed Human Genome Project to accelerate its efforts. Project leader Francis Collins joined Venter at the White House last year to announce that they, too, had substantially cracked the DNA code years ahead of schedule.

A lackluster high school student who lived to surf, Venter credits his experience as a hospital corpsman in Vietnam with spurring an interest in medicine that developed into a passion for research.

Six years after returning to civilian life, he had earned both a bachelor's degree in biochemistry and a Ph.D. in physiology and pharmacology from the University of California at San Diego.



He taught briefly before joining the National Institutes of Health in 1984 as chief of the section of receptor biochemistry. His first significant contribution to gene research came in the 1980s with the invention of the rapid EST method of gene discovery.

Venter left NIH in 1992 to start the Institute for Genomic Research (TIGR), where he developed the "whole genome shotgun sequencing" technique that allowed him to map the first complete genome of a living organism.

This same shotgun technique, along with high-speed DNA sequencers and unparalleled supercomputing facility and proprietary algorithms, was used to sequence and assemble human DNA quickly and accurately.

Other 2001 Common Wealth Award recipients included actor Morgan Freeman, war photographer James Nachtwey, novelist Philip Roth and William and Kathleen Magee, whose Operation Smile provides free reconstructive surgery to children with correctable facial deformities.

Sigma Xi Sponsors Minority Web Site

The Just/Garcia/Hill Science Web site, developed by Sigma Xi Diversity Committee member Robert P. Dottin, is an information network for minority scientists and students contemplating research careers.

The site (www.justgarciahill.org) provides a gateway to a virtual community of minority scientists and facilities networking and mentoring online aimed at enhancing the participation of minorities in science.

Its features include the largest online database in the U.S. of minority scientists, biographies of minority scientists, links to summer research programs, a job service and links to professional organizations and journals.

Visitors can join a discussion/conference on specific topics related to minorities and science using a WebBoard and may also participate in the "Survey of the Week," for which anonymous responses are tallied and posted automatically.

The site is also the home of *Progress Magazine*, a electronic newspaper featuring scholarship opportunities, government initiatives, conferences and other items of interest.

INSIDE

An Interview with Sigma Xi President Marye Anne Fox

On July 1, Marye Anne Fox begins her one-year term as president of Sigma Xi. A member of the National Academy of Sciences, she is chancellor of North Carolina State University in Raleigh and a noted physical organic chemist. The following is excerpted from a longer interview available at <www.sigmaxi.org>.

What progress has been made in finding and implementing innovative, effective ways of teaching undergraduate science and engineering?

I believe there is a more widespread recognition among university and college science and mathematics faculty that although the U.S. leads the world in graduate education, not all is perfect in science and mathematics education in the pre-college years. Many also feel that lower division courses, especially for those not majoring in science, need attention. This recognition has been reflected in a renewed interest in incorporating pedagogical methods into the college experience that emphasize discovery through active learning. In addition, nationwide interest in assessment and educational accountability for schools and universities has opened a dialogue on how best to accomplish valid and useful evaluations of learning and teaching. This reflects on the substantial progress made in successfully developing national standards for pre-college science and mathematics, and the consequent interest in evaluating the quality of teaching in the classroom and laboratory. There are not as yet any broad solutions to these problems, but the enhanced interest level among scientists in promoting scientific careers in American students has been accompanied by a realization that even research-intensive universities must improve the education of prospective teachers and must take the quality of undergraduate instruction for non-majors very seriously.

What do you consider the major hurdles in making faster progress in achieving diversity across the disciplines of science? Is there any particular role societies like Sigma Xi can play in promoting diversity?

Diversity in science is one of our most important challenges, as virtually every demographic study indicates. It is my conviction that if young students had a more accurate perception of the fantastic career opportunities in science, engineering and technology that we'd have a much different pattern of interest among our very best and brightest young people. Anything Sigma Xi can do to tell the stories of our successful scientists, and of successful programs that have attracted young people to science, will be a great help toward our need for building a diverse scientific community.

At this early point in the Bush administration, what indications are there relative to the federal role in science and technology development?

The Bush Administration recognizes, I believe, the importance of support for basic research and support for university education. This imperative has in fact enjoyed bipartisan support for several decades. The level of recommended support so far for the National Institutes of Health is heartening, and the need for balance between these investments and those in the physical sciences will require high priority as we work together for a complete portfolio for federal science and technology investment.

Are you confident that the nation's science and technology enterprise is correctly positioned for the new millennium?

The importance of the science and technology enterprise to the nation's economic health and to the quality of life of all Americans makes vigilance about this positioning an on-going need. But we have a great basis from which to work, and the innovative nature of the American people will demand nothing less than excellence in this endeavor.

This year's Sigma Xi forum and annual meeting will be held in Raleigh. What should delegates take special note of during their stay here next fall?

Coming to the Research Triangle will be an exciting experience for Sigma Xi delegates, because they will be able to see first-hand one of the nation's first and most effective regions for scientific collaboration. In addition to visiting N.C. State's Centennial Campus, delegates can visit our university partners in the Triangle, Duke University and the University of North Carolina at Chapel Hill. They can see initiatives undertaken together, such as the Research Triangle Institute, the Microelectronic Center of North Carolina and the North Carolina Biotechnology Center. Visits to Triangle-located government agencies will be interesting for some as well: for example, the Army Research Office, the National Institute for Environmental Health and Safety, the National Humanities Center. In Raleigh, scientists will particularly enjoy Exploris, a museum dedicated to the social and geographical implications of science, and the Museum of Natural Sciences where they can see the first dinosaur with a heart, a discovery uncovered by N.C. State scientists who developed a new imaging technique and adapted it to paleontologic investigations. I'd encourage delegates to try to stay an extra day or two: they will be amazed!

Roald Hoffmann Among Forum Speakers

Nobel Prize-winning chemist Roald Hoffmann of Cornell University will be among the plenary speakers for the 2001 Sigma Xi Forum *Science, the Arts and the Humanities: Connections and Collisions.*

To be held November 8-9 at the Sheraton Capital Center in Raleigh, North Carolina, the conference will offer a panorama of the influences, both historic and contemporary, of science on the arts and the humanities, and vice versa. The forum will be held in conjunction with the Society's annual meeting.

A long-time Sigma Xi member and frequent columnist for *American Scientist*, Hoffmann is also a poet and playwright. He will present the annual McGovern Lecture.

Other forum speakers include George Bugliarello, chancellor and former president (1973-1994) of Polytechnic University and a past president of Sigma Xi. He is widely known for his eclectic interests and far-ranging insights.

Catharine R. Stimpson will speak on "Creative Co-Dependents: Science, the Arts and the Humanities." She is dean of the Graduate School of Arts and Science at New York University and the author of a novel, *Class Notes*, and of *Where the Meanings Are: Feminism and Cultural Spaces,* on the legendary Gertrude Stein.

"The Art and Humanity of Engineering" will be the topic of a talk by Henry Petroski, whose popular engineering column is a regular feature of *American Scientist*. He is A.S. Vesic Professor of Civil Engineering and professor of history at Duke University. His books include *The Pencil, The Evolution of Useful Things* and *The Book on the Bookshelf.*

Visit <www.sigmaxi.org> for program updates and registration information. Among the topics for concurrent breakout sessions are:

Science on Stage

This session will examine the recent explosion of new plays about science, such as Michael Frayn's *Cophenhagen* and Tom Stoppard's *Arcadia*, and the tradition of science plays that precedes them.

Science and Literature: Bridging the Two Cultures

In their book by this title, a scientist and a humanities scholar attempt to bridge the two cultures This session will address fundamental issues of human nature and the ability of science to understand it, using texts from the biblical *Genesis* to *Brave New World* to explore topics ranging from ethics and social values to chaos theory.

The Arts Foster the Sciences

Artistic discoveries, such as Buckminster Fuller's architectural concepts, have made possible subsequent scientific developments, exemplified by models for chemical and viral structures as well as the recent exploration of origami as a basis for understanding structural folding in many sciences.

The Influence of Scientific Discoveries on Art

Neither Newton nor Goethe would have acknowledged the existence of "two cultures" because their work ranged freely over both the sciences and the humanities. This session will emphasize the inter-relationship between art and the sciences.

Images of Enlightenment

A mandala, or sacred wheel, is an ancient symbol of the diversity and convergence of the paths to truth. This session will present a diagram of the structure of human consciousness encompassing all our creative activities in art, science and religion that produce the metaphors, models and myths by which we live.

Chapter Web Notes

The following news items were gleaned from the more than 130 chapter Web sites now accessible via <www.sigmaxi.org>.

The Tidewater Virginia Chapter held a spring poster session at Old Dominion University.

The Western Kentucky University Chapter held its annual student research conference this spring and also hosted a talk by distinguished lecturer Orrin Pilkey, professor of geology at Duke University.

The Tulane University Chapter has adopted the New Orleans Math and Science High School in a mentoring program.

Among other activities, the University of Toronto Chapter hosted a talk this spring on high temperature superconductivity by university president Robert J. Birgeneau.

At its annual general assembly, the Swiss Chapter hosted a talk on light water/heavy water and the use of stable isotopes in the life sciences, presented by Rolf Siegwolf of the Laboratory of Atmospheric Chemistry at the Paul Scherrer Institute.

The 2001 competition for the C. Daniel Cole Undergraduate Research Award was a highlight of the year for the University of Massachusetts-Lowell Chapter.

The District of Columbia Chapter's annual banquet at the U.S. National Arboretum included a talk by Catholic University physicist Robin L. B. Sellinger on "How Things Bend and Break: Materials Science at the Molecular Scale."

James Watt from the National Center for Infectious Diseases was the featured speaker for the annual initiation and awards banquet for the University of Georgia Chapter.

Six Chapter Ethics Workshops Planned

With support from the National Science Foundation, a series of pilot ethics workshops is planned at six Sigma Xi chapters, an effort that is expected to expand to other chapters in the years ahead.

The workshops will build on discussions at the 2000 Sigma Xi Forum *New Ethical Challenges in Science and Technology* and seek to involve the university community in consideration of ethical issues. The forum proceedings is available online at <www.sigmaxi.org>.

Promoting dialogue about developing and refining institutional capacity to deal with ethical issues and showcasing methods of introducing ethical considerations into instructional programs are among workshop goals.

The Clemson University Chapter workshop will focus on conflicts of interest, intellectual property and data handling, especially as these issues arise in the context of graduate education.

At the Illinois Institute of Technology Chapter, the emphasis will be on integrating the teaching of ethics in science and engineering into existing courses. The target audience will be university and high school faculty.

Human genetic research in the post-genomic world will be the topic of an ethics workshop organized by the Marshall University Chapter.

The University of South Carolina Chapter workshop will involve students and faculty in an interactive, interdisciplinary dialogue on informed consent, intellectual property, conflicts of interest and ethics education.

A workshop on ethics in the education of scientists, examining the methods and approaches to integrating ethics into the science curriculum, is planned by the Saint Louis University Chapter.

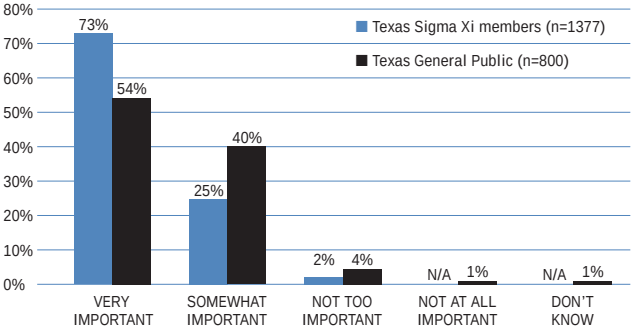
The Michigan State University Chapter workshop will target faculty and students in the life sciences, focusing on ethical issues related to human interventions in the evolutionary process, especially with regard to emerging genetic technologies.

Sigma Xi Survey Includes R&D and Tax Cuts

In partnership with Research!America, Sigma Xi has conducted statewide surveys in Alaska, Delaware, Texas and Ohio to compare the opinions of scientists and engineers with the general public regarding current policy issues. Early results from a recent e-mail survey in Texas (Jan-Feb 2001) show a strong response from Sigma Xi membership (48 percent). Data for the general public in Texas were gathered during May 2000 via random-digit dialing by Charlton Research Company for Research!America (800 responses).

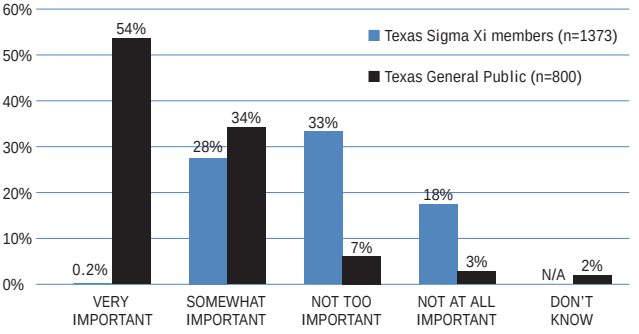
One trend revealed by the Texas surveys in both the scientific/engineering and non-scientific communities is the support for increased R&D (Figure 1). Another trend in Texas indicated that more than half of the general public placed a high level of importance on tax cuts compared to less than 1 percent of scientists and engineers (Figure 2). Complete results will eventually be available for chapters to incorporate into their outreach and advocacy programs to facilitate and enhance communication between scientists/engineers and the general public.

Figure 1



In terms of national priorities, how would you rate increased funding for science and engineering research and development?

Figure 2



In terms of national priorities, how would you rate tax cuts?