

Sigma Xi Today

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Francisco Ayala to Receive Procter Prize

Francisco J. Ayala, a biologist at the University of California at Irvine noted for his contributions to population and evolution genetics, has been selected to receive Sigma Xi's 2000 William Procter Prize for Scientific Achievement. He will deliver the Procter Prize Address at the annual meeting in Albuquerque in November.

Sigma Xi's highest honor, the annual Procter Prize recognizes scientific achievement and an ability to communicate the importance of that research to others. It includes a \$5,000 prize and the privilege of selecting a student, usually working in the same field, to receive a \$5,000 Grant-in-Aid of Research from the Procter Prize Fund.

Ayala has made singular contributions not only to his discipline but to education, philosophy, ethics, religion and national science policy. He has published more than 700 articles and 15 books.

His many scientific achievements include developing a new method for measuring population adaptation, elucidation of the role of genetic polymorphism in determining population adaptation and determining the conditions that allow the coexistence of species competing for limited resources.

He has served on the governing council of the National Academy of Sciences and as president and chairman of the board of the American Association for the Advancement of Science. In addition, he has served on President Clinton's Committee of Advisors on Science and Technology and as president of the Society for the Study of Evolution.

Ayala was a chief witness in the creationist trials in Arkansas in 1981 that prevented religion from being



Francisco Ayala

taught as science in the classroom and has co-authored seminal papers on the role of expert witnesses in the judiciary. His philosophical writings range from the scientific method to the biological foundations of ethics.

His books include *Tempo and Mode in Evolution* (1995), *Modern Genetics* (second edition, 1984), *Population and Evolutionary Genetics: A Primer* (1982) and *Evolving: The Theory and Processes of Organic Evolution* (1979).

A member of the National Academy of Sciences, the American Academy of Arts and Sciences and the American Philosophical Society, Ayala has been a Guggenheim Fellow and a Fulbright Fellow.

He is a foreign member of the Accademia Nazionale dei Lincei (Rome), the Russian Academy of Sciences, the Royal Academy of Sciences of Spain and the Latin American Institute for Advanced Studies.

Born in Madrid, Ayala has lived in the U.S. since 1961. He is the Donald Bren Professor of Biological Sciences and professor of philosophy at UC-Irvine. He has also taught at Providence College in Rhode Island, Rockefeller University and the University of California at Davis.

Education Program Draws Interest From 40+ Chapters

More than 40 Sigma Xi chapters have expressed interest in hosting future workshops on undergraduate science and engineering education reform, if Sigma Xi is able to expand this new effort over the next three to five years.

With the support of a planning grant from the National Science Foundation, a variety of discussions and events to pilot this program have taken place. Chapter-based workshops involving university leaders were held this spring at California State University at Long Beach and North Carolina State University.

In the next phase of the project, plans call for one-day workshops and follow-up activities aimed at showcasing effective practices in undergraduate science and engineering education, exploring the relationship between research and education and catalyzing institution-wide reform at the host institutions.

This program will also involve cooperation with Project Kaleidoscope and other organizations in discussing, exploring and implementing effective practices on hundreds of campuses.

For updates on this and other Sigma Xi programs, visit <www.sigmaxi.org>.

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An Interview with Sigma Xi President John H. Gibbons



On July 1, former presidential science advisor John H. (Jack) Gibbons begins his term as president of Sigma Xi. This article is excerpted from a longer interview on the Web at <www.sigmaxi.org> in the "Sigma Xi News" section.

What surprised you most during your career as you moved from research to science policy?

I eased through the transition from fundamental science to environmental and energy issues and then into public policy. The issues of public policy and technology assessment are very difficult and complex. There's political intrigue, social pressures and perceptions versus realities.

The government policy world badly needs guidance and advice from specialists. We have to provide a bridge so policy-makers can have accurate, understandable information when they need it most. As C.P. Snow said, it's like learning a new language. And it's happening at a time when, more and more, the public is becoming too distant from the knowledge they need to make informed choices and decisions.

Sigma Xi is holding a major forum in Albuquerque in November on "New Ethical Challenges in Science and Technology." The progress of science itself has created many of these challenges. Is the scientific community prepared to meet them?

This focus on ethical challenges is important for Sigma Xi because, in particular, science and technology

are moving very rapidly in areas that are intimately connected to people's lives. We're doing things that affect the products people buy in grocery stores and drug stores, things that affect the air we breathe.

Society wants to move slowly in the area of genetically modified foods, for example, and we need to understand that conservatism. It's not simply a matter of not understanding the science. Some question whether what's being done is appropriate. At the core of some of these arguments is a sense of values, priorities and need for conservatism.

That means, in biotechnology, we have to be concerned not only with the biological modification of a plant, but with the development of definitive tests of ecosystem impacts that ensure its safety in the environment. We need to heed lessons from the past, lessons learned from the use of human antibiotics in livestock feed, for example, which could lead to the rise of super pathogens. We need to spend more time reassuring ourselves, even if it means not going as fast as some commercial interests would like.

Back in the mid-1990s, I recommended the establishment of a National Bioethics Advisory Commission and this came into being just in time for the cloning of Dolly. We need to anticipate these sorts of developments and be prepared for them.

What might Sigma Xi chapters do to help address science education and the public understanding of science?

The excitement, joys and wonders of scientific discovery need to be better shared with the taxpayers who are footing the bill, so they can derive some sense of participating in the joy of discovery. The frontiers of science are producing exciting discoveries about the fundamental nature of the universe. It's important to promote the public understanding of science, so people can appreciate how science enriches their lives and helps them understand the forces that affect them.

As James Madison said, we need the power that knowledge gives us.

Sigma Xi is an important element in moving the public to a new kind of literacy. At the local level, Sigma Xi chapters have a major role to play, not only within their institutions, but within the community, to engage people in seminars and forums and promote a dialogue. The drop-out rate in science classes among non-science majors is disturbing. Sigma Xi's recent national focus on inquiry-based undergraduate science and engineering education reform is a positive step in the right direction.

Since the Congressional Office of Technology Assessment was eliminated in the 104th Congress, how has the Congress been getting its advice on science?

The story of OTA brings to mind a prize-winning essay written by a young student. It went like this: "My essay is on Socrates. He was a great man who gave advice to other people. He was poisoned." OTA fell victim to a Congressional zeal for budget cuts and an unhealthy dose of political ideology.

It concerns me that Congressional committees and individual members have to scurry around for advice. The need is definitely there, underscored by Federal Reserve Chairman Alan Greenspan's recent remark on the critical importance of science and technology to our national economy.

Sigma Xi has an important role to play in public policy, because members of Congress like to hear from their constituents. They especially like to hear ideas from the people in their own districts. The science advocacy program, in which some chapters have initiated meetings with their elected representatives, is a good start. Sigma Xi chapters should ask what are the issues, and what should our elected representatives do about them? As they do that, they will be drawn into the reality and complexity of public policy, which is an education in itself.

Membership Survey Highlights Society Priorities

This spring, Sigma Xi tested the concept of polling members electronically by distributing a 20-question survey to a random sample of 1,000 Sigma Xi members for whom e-mail addresses were available. The response rate was 43 percent.

Participants were asked to prioritize general Sigma Xi program areas and more specific categories of benefits and services. Most program areas were considered a high or top priority (4-5 on a 5 point scale) by at least 50 percent of the respondents.

However, when asked which single program area would be their highest priority for Sigma Xi, programs were ranked as follows: Public understanding of science (31 percent), K-12 education (16 percent), science policy (16 percent), undergraduate education (15 percent), ethics/honor in science (10 percent) and international expansion (4 percent). The remaining 8 percent listed no highest priority.

When asked to choose a single benefit or service that would be their highest priority, items were ranked as follows: Programs for younger members (35 percent), recognition and awards (13 percent), diversity programs (13 percent) career/leadership training (13 percent), *American Scientist* indexes/archives (12 percent), online discussions/conferences (4 percent), discount on professional resources (3 percent), personal benefits (2 percent), other (5 percent).

"The survey proved the efficiency and cost-effectiveness of using e-mail to poll our members," Sigma Xi Executive Director Peter D. Blair said, "and we are confident the approach can be refined for more rigorous statistical validity."



Ballard Receives Common Wealth Award

Marine scientist and deep-sea exploration pioneer Robert D. Ballard received the 2000 Common Wealth Award for science and invention. Sigma Xi nominates recipients of the annual award, which carries a prize of \$50,000.

Among many other honors, Ballard received Sigma Xi's 1990 William Procter Prize for Scientific Achievement. In a career spanning three decades, he has come to be regarded as a spokesman for the oceans, having taken part in more than 100 deep-sea expeditions.

Ballard's discoveries include hot springs deep in ocean waters and such famous shipwrecks as the ill-fated British ocean liner *Titanic*, the German battleship *Bismarck* and the U.S. aircraft carrier *Yorktown*.

He is also founding chairman of the JASON Foundation for Education, a distance learning program that takes young students on scientific expeditions around the world via live, interactive broadcasts.

From 1969 to 1995, Ballard worked at the Woods Hole Oceanographic Institution, advancing to director of the Center of Marine Exploration. There he helped develop manned submersibles and remotely operated vehicle systems for use in deep-sea research. These devices allowed him to explore areas that had never before been accessible.

It was in 1977, while exploring the Galapagos Rift off the coast of Ecuador, that he and his team made what has been called the most important discovery in marine biology in 200 years. In 8,500 feet of water, they found unusual hot springs – hydrothermal vents – surrounded by exotic animals, including giant tube worms, some more than eight feet long, living and thriving in total darkness. These findings altered long-held theories about the origin of life on earth and earth's geological processes.

In 1979, he found black smokers off the coast of Baja California. These underwater volcanoes erupt with



Robert D. Ballard

hot fluids that shoot up from the sea floor through chimneys formed by mineral deposits.

More recently, Ballard's work has concentrated on developing a new field of research in deep water archaeology. He is founder and president of the Institute for Exploration, where his team has discovered ancient ships, some of the oldest ever found in the deep sea.

The author of 15 books, including two bestsellers, Ballard has helped produce more than six Emmy award-winning television documentaries. He received National Geographic's highest award, the Hubbard Medal.

A commander in the U.S. Naval Reserves who served on active duty during the Vietnam War, he earned his Ph.D. in marine geology and geophysics from the University of Rhode Island.

The Common Wealth Awards of Distinguished Service were created by the will of Ralph Hayes, a former director of Bank of Delaware, now PNC. The award recognizes achievement in literature, public service, government, sociology, science and invention, dramatic arts and mass communications.

Other 2000 award recipients included Archbishop Desmond Tutu, novelist E.L. Doctorow, CNN chief foreign correspondent Christiane Amanpour and dancer Mikhail Baryshnikov.

Forum to Address New Ethical Challenges

As the honor society of science and engineering, Sigma Xi has a long-standing interest in ethics in research, particularly with regard to the teaching and mentoring of students who will become the next generation of researchers.

On November 9-10 in Albuquerque, New Mexico, the 2000 Sigma Xi Forum *New Ethical Challenges in Science and Technology* will revisit some topics from the last major Sigma Xi forum on ethics in research held in 1993 – such as conflicts of interest – and will also address issues that were just beginning to surface then. The forum is expected to attract participants from academia, government and industry.

It will provide an opportunity for further distribution and discussion of Sigma Xi's new booklet, *The Responsible Researcher: Paths and Pitfalls*, an updated look at ethical issues in science and technology that was designed as a companion volume to the widely circulated Sigma Xi booklet of guidelines for young scientists *Honor in Science*.

Post-conference plans include development of ethics course materials for dissemination through a series of workshops hosted by Sigma Xi chapters. This will be part of an ongoing program on ethics in research under the auspices of the Sigma Xi Center in Research Triangle Park, N.C.

Plenary speakers include William Wulf, president, National Academy of Engineering; Arthur Rubenstein, dean, Mount Sinai School of Medicine; David Goodstein, vice provost and professor of physics, California Institute of Technology; Francisco J. Ayala, professor of biological sciences and philosophy, University of California at Irvine; and Robert C. Dynes, chancellor, University of California at San Diego.

Breakout group topics and leaders include Teaching Ethics, led by Vivian Weil, director, Center for the Study of Ethics in the Professions, Illinois Institute of Technology; Intellectual



Freedom, led by John C. Browne, director, Los Alamos National Laboratory; and What is Misconduct?, led by Sybil Francis, White House Office of Science and Technology Policy.

Other breakout group topics and participants include Intergenerational Ethics, led by John H. Gibbons, former presidential science advisor and 2000-2001 president of Sigma Xi; and Conflicts of Interest, led by Paul A. Fleury, dean of engineering, University of New Mexico, with panelist Kumar Patel, a National Medal of Science recipient and past president of Sigma Xi.

Erling A. Anderson of the University of Iowa will lead a breakout group on Future Problems Facing Scientists. David C. Clark of Rush-Presbyterian-St. Luke's Medical Center will lead a discussion on Principal Investigator Oversight of Staff, and Caroline A. Whitbeck of Case Western Reserve University will lead a discussion on Web resources for addressing research misconduct.

For registration information and program updates, visit the forum section on the Sigma Xi site at <www.sigmaxi.org>.

Packard Initiative Seeks to Expand Sigma Xi Network

A Sigma Xi planning group has established contacts in a number of countries in the first phase of the Packard Initiative to expand the Society's network of international chapters, particularly in developing countries. An initial focus is in Latin America, pursuing possibilities to create additional Sigma Xi chapters in Mexico, Brazil, Argentina, Chile and other countries.

This exciting new international program is being funded by a three-year grant from the David and Lucile Packard Foundation. A long-time Sigma Xi member, supporter and advisor, the late David Packard was co-founder of the pioneering Hewlett-Packard Company and firmly believed in the power of technology to improve people's lives.

The goal of the Sigma Xi Packard Initiative is to create networks of scientists and engineers in developing countries and to foster long-term partnerships between those communities and established Sigma Xi chapters. The benefits for new international chapters will include increased access to the scientific literature via the Internet, a chapter Web site, Internet listservs and electronic discussion groups and participation in Sigma Xi's Distinguished Lectureship program.

Chapters formed under the initiative will receive direct financial support for organizational activities, including a seed grant of up to \$2,500 (U.S.) to help with administrative costs and to support a range of activities that might include Internet access, computer equipment, a local meeting or subsidies for initial membership dues. In addition, travel funds will be available for networking activities and attendance at Sigma Xi's annual meeting.

Sigma Xi staff and existing chapters will offer guidance and support. For more information contact Lisa Rhoades, at 800-243-6534 or at lrhoades@sigmaxi.org.