

Sigma Xi Today

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Louis Miller Wins Common Wealth Award

Louis H. Miller, chief of the Laboratory of Parasitic Diseases at the National Institute of Allergy and Infectious Diseases (NIAID), received the 1999 Common Wealth Award for Science and Invention in April at a ceremony in Wilmington, Delaware.

He was honored for his contributions to research on malaria, the most widespread of tropical diseases, and to its control and treatment.

Common Wealth Awards recognize outstanding contributions in literature, public service, science and invention, sociology, government, dramatic arts and mass communications.

The award was established by the late Coca Cola executive Ralph Hayes, a former director of Bank of Delaware, now PNC Bank. Sigma Xi nominates recipients of the science and invention award.

During his career, Miller has made important discoveries about the tools malaria parasites use to infect and survive in humans and mosquitoes. Of particular significance, he identified a molecule on red blood cells that allows the malaria parasite to invade them and proliferate in the bloodstream. Miller and his research team identified a parasite molecule that binds to the red blood cell.

Further, they identified molecules that malaria-infected red blood cells use to stick to blood vessel walls to avoid passing through the spleen where they would be destroyed. These molecules are now being tested for possible development into a malaria vaccine.

Miller is also interested in, and has done some research on, how genetic engineering could be used to neutralize mosquitoes that act as carriers of malaria in regions where it is endemic.



Louis Miller

The most critical malaria-related challenge at this time, Miller said, is "the development of resistance to the cheap and effective medicines, chloroquine and fansidar, that are used at the local village level. There are limited resources in Africa to buy the more expensive anti-malaria drugs, so when the cheaper drugs no longer work, it's a real problem, and there aren't many other choices in the pipeline."

A graduate of Haverford College, Columbia University and the medical school at Washington University, Miller began working on malaria in 1965 when he was assigned to Bangkok, Thailand, with the U.S. Army Medical Corps. In 1971, he came to the National Institutes of Health (NIH) to head the malaria section of the Laboratory of Parasitic Diseases.

He is a recipient of many awards and honors, including the Bristol-Myers Squibb Award for Distinguished Achievement in Infectious Disease Research, election to the National Academy of Sciences and the Institute of Medicine, and the Paul Ehrlich-Ludwig Darmstaedter Prize.

Carver Mead Wins Prestigious Invention Prize

Sigma Xi member Carver Mead, a professor of engineering and applied science at the California Institute of Technology, was awarded the 1999 Lemelson-MIT Prize in April for his pioneering work in the development of tiny transistors that helped launch the information age.

The \$500,000 prize has been awarded annually since 1995 and was funded by prolific inventor Jerome Lemelson, who died in 1997. Award recipients are selected for inventions that are commercially successful, improve the quality of life and help strengthen the United States competitively.

In 1970, Mead came up with the revolutionary idea that the transistor could be reduced to .15 microns, or less than the diameter of a human hair. His forecast has nearly come true. The smallest transistor today is .18 microns.

He also invented a hearing aid powered by a digital microchip and a standard amplifying device used in the microwave communications systems that people rely on daily when making telephone calls or connecting to the Internet.

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An Interview with Sigma Xi President Peggie Hollingsworth



On July 1, Peggie J. Hollingsworth begins her one-year term as president of Sigma Xi. The following article is excerpted from a longer interview that is available at <www.sigmaxi.org> in the "Sigma Xi News" section. Hollingsworth is a University of Michigan pharmacologist and toxicologist who has been active in Sigma Xi, both locally and at the Societal level, for many years.

What goals do you have for your year as president?

First, I would like to see Sigma Xi increase its efforts to stimulate participation of members of the Society in Sigma Xi activities at the level of the local chapter....We must develop ways to better communicate with our local chapters so that they are made aware of the rich variety of programs with which Sigma Xi is involved and of the excellent resources that are available from headquarters in Research Triangle Park.

Second, I would like to see Sigma Xi develop further the mentorship program that has been suggested by the Committee on Diversity. This program would involve the participation of Sigma Xi members as mentors to students at the local level...An effective mentorship program would increase greatly the visibility of Sigma Xi within the academic community and would prepare young scientists and engineers for participation in the activities of the Society....

Third, I would like to see Sigma Xi continue and even intensify its efforts to make the science and engineering professions more inclusive

and to better educate society at large as to the value of science to the well-being of humankind....

The highest number of chapters in the Society's history have been reported in "good standing." Do you think this indicates a resurgence of activities among the chapters?

This is of course very good news, especially in light of the annual reports of a decreasing membership and the nagging concern we have had for many years that we must find ways to reverse the decline in our membership. "Good standing" means that local chapters are inducting new members and are filing an annual report with the international headquarters in Research Triangle Park. This news suggests that there is an interest in Sigma Xi at the "grass-roots" level and that the time might now be ripe for efforts that I have already mentioned to build the Society at that level.

Michigan chapters have been meeting regularly with members of their Congressional delegation to talk about the importance of research to our national interests. Is this science advocacy program something that other Sigma Xi chapters can effectively pursue?

... I personally took part in two such meetings, one with Congressman John Connors from Detroit and the other with Congressman Vernon Ehlers from Grand Rapids. At each of these meetings there were representatives from at least three different Sigma Xi chapters as well as the Congressman. My impression was that these meetings were quite valuable and that all who attended benefited from them.

The science advocacy program has a number of attractive features – it involves participation of members at a local level; it brings together members from several chapters within a geographical region, which encourages the cross-fertilization of ideas about chapter programs and fosters other collaborative efforts; it fulfills a responsibility of Sigma Xi to educate

the public and particularly its elected representatives with respect to issues of importance to scientists and engineers; and it can be carried out with modest resources since the major component is the voluntary participation of Sigma Xi members.

You will be presiding over the 1999 Sigma Xi Forum in Minneapolis (November 4-5) on reforming undergraduate science and engineering education. What do you hope will come out of this conference?

The idea that undergraduate education, not only in science and engineering but in all disciplines, should be more inquiry and research based has been actively debated for a number of years. In a Sigma Xi forum on science education held in 1992 at the University of Michigan, Professor Homer Neal, who at the time was a member of the National Science Board and who subsequently became interim president of the University of Michigan, recommended that every undergraduate student be required to have a research experience as part of her/his education.

The issue was brought to the forefront in 1998 with the report of the Boyer Commission on Educating Undergraduates at the Research University. This report was highly critical of undergraduate education at many of the major research universities in the United States, and among its recommendations was one similar to that which had been made by Homer Neal. The mixed reaction from university campuses demonstrated that the concept of a required research experience was highly controversial and certainly not accepted by all faculty.

The Sigma Xi forum...takes place at an opportune time. Educators will have had ample time to deliberate upon, debate and react to the Boyer Commission Report and to the concept of making undergraduate education more inquiry and research based. Sigma Xi will have a unique opportunity to contribute to this discussion....

1999 Sigma Xi Forum Topics Explore Science Education Reform

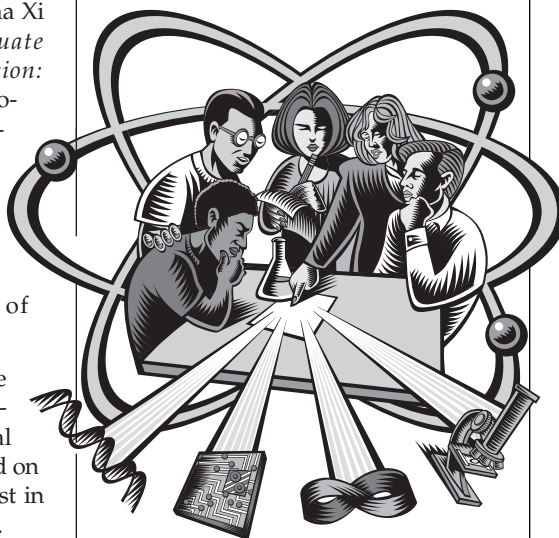
Plenary lectures at the 1999 Sigma Xi Forum *Reshaping Undergraduate Science and Engineering Education: Tools for Better Learning* will introduce the three major topical components of the conference: best practices, creating an environment for inquiry-based learning and tools for better learning. The opening address will be given by National Academy of Sciences President Bruce Alberts.

To be held November 4-5 at the Hyatt Regency Minneapolis in conjunction with Sigma Xi's Annual Meeting, the 1999 Forum will build on the Society's long-standing interest in science and engineering education.

Short concurrent sessions will explore various aspects of each of these themes, and discussion groups will offer further opportunity for information exchange. Within these thematic areas, session topics include: Inquiry in Large Classes, Project-based Learning, Inquiry in Small Classes, Research Experiences, Effecting the Cultural Change Needed to Implement Inquiry-based Learning, Building Inquiry Into the Curriculum, Developing Partnerships, Accessing Databases for Inquiry-based Learning, Resources on the Internet, Digital Libraries and Tools for Assessing Inquiry-based Learning.

The 1999 Sigma Xi Forum will allow educators and administrators from academia and industry to experience innovative science instruction, experiment with state-of-the-art educational products and discuss a variety of models for institutional reform, science curriculum and pedagogy.

Leaders in both science and education have recognized that producing a scientifically literate population will require that, "all students have access to supportive, excellent undergraduate education in science, mathematics, engineering and technology, and all students learn these subjects by direct experience with the methods and processes of inquiry"



(*Shaping the Future*, NSF 96-139). New initiatives in science, mathematics, engineering and technology education benefit both the scientific community and society in general by including more citizens in the scientific enterprise.

The teaching methods that are effective in providing this education are now established and many excellent examples of best practices are available. The 1999 Sigma Xi Forum will both explore and employ these best practices.

Goals: The meeting will (1) employ principles of inquiry-based learning while exploring issues and methods associated with educational reform and (2) foster an interdisciplinary discussion of science education reform.

Audience: In addition to Sigma Xi members and chapter representatives, the forum is expected to attract participants from colleges, universities and other institutions that participate in educational partnerships that support the principles of inquiry-based learning.

Contributed Presentations and Demonstrations: In addition to invited presentations, the conference will feature a large component of contributed presentations. Individuals may submit abstracts until July 1.

Presentations may include demonstrations of products or techniques and are subject to review by the conference organizing committee. See page 384 for further details.

Format: As much as is possible, the program itself will employ the principles of active learning and, hence, will feature only a few traditional plenary talks from leaders in undergraduate science education reform, followed by concurrent sessions addressing those issues in more detail. Poster presentations and demonstrations will highlight hands-on activities and the latest technological tools for inquiry-based learning across the disciplines. Roundtable discussion groups will address various aspects of inquiry-based learning and will feature moderators, including educators, researchers and administrators, who have catalyzed or facilitated change in institutions.

Web-based Resources: In conjunction with the planning for this conference, staff will build an Education Resource Page on the Sigma Xi Web site. Suggested hotlinks may be submitted to forum@sigmaxi.org or via the interactive form on the Resource Page. Additionally, a directory of Internet resources will actually be built in real time during the forum with contributions from participants. Finally, many forum presentations will be recorded and available for access via the Web.

Annual Meeting Activities: During the Sigma Xi Annual Meeting, which follows the forum, several workshops will address Sigma Xi's role in undergraduate education reform and possible chapter activities that can support the dissemination of information about best practices and tools for better learning. Additional annual meeting workshops and activities are detailed on the Sigma Xi Web site.

For more information about the 1999 Sigma Xi Forum, contact forum@sigmaxi.org, call 800-243-6534 or visit the forum site at www.sigmaxi.org.

Help Sponsor International Sigma Xi Chapters

Sigma Xi's International Committee has initiated a program to assist in the formation of new chapters outside of North America. International scientists and engineers have indicated that one of their primary interests in Sigma Xi membership lies in the potential for building new relationships with members outside their immediate laboratory. Please help add to the Sigma Xi network by having your chapter become a sponsor chapter.

Sponsor chapters will work with headquarters staff to establish communication between members affiliated with their chapter and scientists in similar fields living abroad. Once the lines of communication have been established, sponsors may nominate the international scientists for membership in the Society. The sponsor chapter can advise, encourage and assist with the chapter chartering process.

Assistance may be, but is not required to be, in the form of financial aid to help defray membership costs for members in countries with reduced personal incomes or where currency exchange is problematic. Contributions should be made to the Young and International Scientist Fund through headquarters. This fund helps defray the cost of annual dues for young scientists and international members whose income is below U.S. \$15,000.

Sigma Xi is especially interested in sponsoring chapters in Latin America, Central America, South Africa, China, Japan, Korea and the countries of Central and Eastern Europe, including Russia. If your chapter is interested in participating and/or if you already have international contacts with potential members and would be interested in helping to form an international chapter, please contact Ann Williams at 800-243-6534 ext. 204 or awilliams@sigmaxi.org.

1999 Forum Proposal Deadline is July 1

July 1 is the deadline for submitting presentation proposals for the 1999 Sigma Xi Forum *Reshaping Undergraduate Science and Engineering Education: Tools for Better Learning*, to be held November 4-5 in Minneapolis, Minnesota, in conjunction with Sigma Xi's 1999 Annual Meeting.

This interactive conference will give educators and administrators from academia and industry the opportunity to experience innovative science instruction, experiment with state-of-the-art educational materials and discuss a variety of models for institutional reform, science curriculum and pedagogy with their developers.

There are no initial restrictions on the format or length of presentations. Formats may include, but are not limited to, demonstrations of tools, techniques or activities, discussion groups or workshops and poster presentations.

The inclusion of presentations on the program is at the discretion of the organizing committee. Likewise, the committee may request a change in format to suit program needs. Receipt of proposals will be acknowledged, and authors will be notified about the status of their presentations no later than July 31. All individuals whose presentations are accepted for inclusion in the program will be expected to register for the forum.

Please visit the 1999 Sigma Xi Forum site on the Web at www.sigmaxi.org for complete information about submitting presentation abstracts for consideration.

RTP Chapter Advises State Government

Following the example of Michigan Sigma Xi chapters, several others have begun science policy initiatives, setting up projects, campus tours and regular visits to help keep legislators informed about issues in science and technology.

In April, the Research Triangle Park (RTP) Chapter released an assessment of more than a dozen key environmental issues for the future in North Carolina. The report was undertaken at the request of the Office of Environmental Education, within the N.C. Department of Environment and Natural Resources.

Titled "Emerging Environmental Issues in North Carolina," the report was developed with the assistance of the Carolina Environmental Program, an organization of environmental faculty and research staff at the University of North Carolina at Chapel Hill.

"The RTP chapter hopes this report will be helpful in continuing to educate North Carolinians about threats to the environment," according to chapter president Jack C. Scarborough, who noted that the chapter

has recommended the survey be extended to include Sigma Xi chapters across the state.

The report discussed emerging environmental threats and the method used to identify them. Among the North Carolina environmental issues identified were:

Habitat fragmentation as large geographic regions are broken into non-contiguous parcels of land. Endocrine disruption caused by a variety of hormones interacting with cells and DNA to trigger or suppress cellular control processes in essentially all living species.

Saltwater intrusion into fresh water aquifers along coastlines resulting from diffusion of sea water into these aquifers. Emerging pathogens resulting from the introduction of disinfectants into drinking water coupled with the general evolution of microbes.

For more information about the survey and its results, visit the RTP Chapter's home page on the Sigma Xi site at www.sigmaxi.org (in the "Chapters" section).