

Sigma Xi Today

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Dynamic, Interactive Sessions to Energize Annual Meeting

Engaging talks by prize-winning scientists. Dynamic workshops and panel discussions. Outstanding research presentations. Unique networking opportunities.

These elements will combine to make the 2005 Sigma Xi Annual Meeting and Student Research Conference a productive and stimulating experience.

Several hundred Sigma Xi chapter delegates from North America and abroad are expected to attend the November 3-6 meeting at the Westin Seattle Hotel.

In addition, hundreds of students from around the country will showcase their research November 4-5 during the Sigma Xi Student Research Conference, held in conjunction with the annual meeting.

In his Procter Prize Lecture on Friday, November 4, renowned computer scientist **Bjarne Stroustrup** will give a personal view of his revolutionary C++ programming language. His talk is free and open to the public. (See related article on page 574.)

New for 2005, a reduced price ticket for Saturday's events only will enable a broader audience to see what Sigma Xi has to offer.

The Saturday program includes a talk by celebrated oceanographer **Sylvia Earle**, who will receive Sigma Xi's annual John P. McGovern Award. She will speak on "Adventures in Communicating Ocean Science, Technology, Policy and Conservation."

Texas A&M University's **Thomas Spencer**, winner of the Young Investigator Award, will give a lunchtime presentation Saturday about his groundbreaking research in reproductive biology and endocrinology.

Also that day, award-winning science writers **Ira Flatow** and **David Quammen** will be inducted as honorary Sigma Xi members. Both will be available for book signings and conversations.



Some of the Society's newer programs oriented toward early and mid-career advancement will be featured on Saturday. These include a discussion of Sigma Xi Postdoc Survey results, a presentation on diverse career options in science and engineering, plus sessions on classroom computation and depicting scientific concepts.

Other presentations are planned on ethics and public policy, aerospace engineering, thermodynamics in complex systems and the challenges of communicating science.

The meeting will also include workshops, panel discussions and roundtables for Sigma Xi delegates on chapter leadership and management, outstanding chapter programs and chapter revitalization.

Descriptions of all sessions are available online at www.sigmaxi.org, along with the complete schedule of activities, online registration and details of the Saturday-only ticket option.

Three new sessions have been added to the program since our last update:

Ethics Panel Discussion

John F. Ahearne, director of the Sigma Xi Ethics Program, will moderate a Saturday panel discussion of how ethics and public policy interact and sometimes are in conflict. The three panelists will be retired Boeing senior vice-president **Kenneth Holtby**; **Thomas Leschine**, director of the University of Washington's School of Marine Affairs; and **Brewster C. Denny**, founder of the UW's Graduate School of Public Affairs.

Aerospace Engineering

Patricia "Trish" Beckman, an aeronautical flight test engineer with Boeing, will give a technical presentation Friday on aerospace engineering. She oversaw production of F-18s at McDonnell Douglas in St. Louis. Prior to that, while in the U.S. Navy, Beckman trained and qualified as the first female navigator in the F-15 and attended test pilot school.

The Grant Review Process

A panel of representatives from funding agencies will discuss what happens to the grant proposals they receive. This will be a unique opportunity to find out how to get grants funded! Designed for researchers early in their grant-writing careers.

INSIDE

Cotton Wins Ferst Award	574
A Personal View of C++	574
Turning Kids into Scientists	575
Sigma Xi News Briefs	576

Albert Cotton Wins Monie Ferst Award

The winner of Sigma Xi's 2005 Monie A. Ferst Award has been a household name among chemists for nearly 50 years.

A recipient of the National Medal of Science, F. Albert Cotton holds the W. T. Doherty-Welch Foundation Chair in Chemistry at Texas A&M University and is director of the Laboratory for Molecular Structure and Bonding there.

His career as a research chemist and a participant in developing major aspects of national science policy has received considerable recognition.

A member of the National Academy of Sciences, Cotton has won all of the significant medals of the American Chemical Society—the Priestly Medal and Robert A. Welch Award among them. He also received the 2000 Wolf Prize in Chemistry, one of the world's premier science awards.

But colleagues say another phase of his career has not received nearly enough recognition. And it is one in which Cotton has taken special satisfaction, namely the teaching and promoting of future generations of academic chemists.

Administered by the Georgia Institute of Technology Chapter of Sigma Xi, the Monie A. Ferst Award is presented annually to those who have made notable contributions to the motivation and encouragement of research through education.

The award consists of a medal and \$5,000 and is made annually to a scientist who has inspired his or her colleagues to significant scientific achievements. It is usually presented during a daylong symposium focusing on the achievements of the winner's former doctoral students.

Over Cotton's career, 111 young men and women have received their doctoral degrees under his supervision and nearly half have become academics. He has also been a dedicated mentor to postdoctoral fellows, 64 of



F. Albert Cotton

which hold academic positions in the U.S. and 16 in other countries.

His second major contribution to chemistry education has been in the writing of textbooks, at every level from high school to postgraduate study.

Widely used at home and abroad, these include the high school text *Chemistry, An Investigative Approach*, plus college texts on basic and advanced inorganic chemistry, as well as his pioneering *Chemical Applications of Group Theory*.

After receiving his bachelor's degree in chemistry from Temple University and his Ph.D. from Harvard, Cotton taught at the Massachusetts Institute of Technology for 17 years before going to Texas A&M in 1972.

A major contributor to several areas of chemistry, he discovered the existence of double, triple and quadruple metal-metal bonds. His work has added valuable knowledge to chemistry, physics, biochemistry, molecular engineering and chemical engineering.

A recent citation from Ohio State University read in part: "Through his highly regarded textbooks and his skill as a mentor, he has shared his knowledge with the world's scientific community and with his many students. As both dedicated scholar and innovative teacher, he is without peer."

Stroustrup Gives Personal View Of C++ Language

Twenty-five years ago when he invented C++, computer scientist Bjarne Stroustrup, now at Texas A&M University, could hardly have envisioned the astounding array of applications his revolutionary computer language would spawn.

Currently used by more than 3 millions programmers worldwide, C++ has been the foundation for Google, Internet Explorer, Adobe Acrobat, Photoshop and critical parts of telephone systems, to name only a few of its many uses.

In his Procter Prize talk during Sigma Xi's Annual Meeting and Student Research Conference in Seattle, Stroustrup will present a personal view of factors that were and still are critical for C++'s sustained success.

His talk on "C++: Evolving a Language in and for the Real World" is set for 4:15-5:30 p.m. on Friday, November 4, at the Westin Seattle Hotel. The lecture, free and open to the public, will be followed by a book signing.

"Many of the key ideals and principles that were applied—with varying degrees of success—in creating C++ involve non-technical concerns," Stroustrup says. "Real-world language evolution differs significantly from 'green field' and 'blue sky' design, especially since it requires long-term evolution in a world of shifting external pressures rather than specifying an ideal design once and for all."

Sigma Xi's highest honor, the William Procter Prize for Scientific Achievement is presented annually to an outstanding scientist or engineer known for effective communication of complex ideas.

The prize includes presentation of a \$5,000 Grant-in-Aid of Research to a young colleague of the recipient's choice.

Tadpole Metamorphosis Turns Youngsters into Scientists

Sigma Xi member Scott P. McRobert relates how an interest in frog development helped transform second-graders into young scientists. He is a professor of biology at Saint Joseph's University in Philadelphia.

This is the story of a research project to study the effects of temperature on tadpole development. The work was relatively straightforward—tadpoles were raised at various temperatures while their development was monitored.

The results were also straightforward—higher water temperatures led to faster developmental rates and reduced time until metamorphosis. The really interesting aspect to this study is the fact that it was conducted, to a large extent, by second-graders.

The idea had been brewing for a number of years. In 1998, Robert Korbeck and I studied the effect of temperature on development in the tropical poison frog, *Dendrobates auratus*.

We showed that an optimal temperature range existed in which tadpoles developed quickly, with high survival rates. At temperatures outside this range, the time until metamorphosis was longer, and survival rates fell significantly.

I was hoping to run a similar study on a temperate amphibian species, and the American toad, *Bufo americanus*, seemed ideal.

These toads are explosive breeders, producing thousands of eggs each spring. Their tadpoles complete metamorphosis in a single season.

And American toads are common in eastern Pennsylvania. All that was left was to find a good source of them.

One day in the spring of 2004, while picking up my daughter at her el-

ementary school, we heard toads singing. Following the sound, we found that a small pond at the back of the school was teeming with mating toads.

In talks with Friends' Central School science teacher Barbara Cole, the idea evolved to have the second grade students actually run a research project themselves.



PHOTOGRAPH BY DAWN OVALLE

The research team included myself and Barbara Cole, along with Saint Joseph's University students Melissa Lutz and Rebecca Dawson and the entire FCS second grade of about 60 students.

Each day, Barbara Cole took students to observe conditions in the pond or in experimental tanks. Melissa Lutz and Rebecca Dawson prepared materials for the study, monitored the experimental tanks at SJU and participated in workshops for the students.

During the winter the students took daily measurements of the temperature and conditions at the pond. This gave them an opportunity to read thermometers and add their results to data sheets.

In April, toad eggs were collected from the pond and hatched in my laboratory. Tadpoles were housed individually in plastic cups, which were

placed into tanks at SJU and FCS. We maintained the experimental tanks at five different temperatures.

Daily routines for the students included measuring the water temperature, feeding the tadpoles and monitoring their development by looking for the appearance of legs.

The students maintained journals documenting each day's results.

As mentioned, our results showed that tadpoles reached metamorphosis faster in warmer waters. We presented our findings at SJU's 16th Annual Sigma Xi Student Research Conference.

The poster was even manned for a time by one of our second-graders, who explained the project alongside other, albeit older, scientists.

There were of course some challenges. The students became very attached to their tadpoles, naming them despite our suggestion to simply assign them numbers.

This made the inevitable tadpole death a bit more tragic. And teaching certain concepts turned out to be surprisingly difficult.

While the students had no problem with the overall methodology, learning to read a thermometer, or understanding the toads' life cycle, the concept of sample size and averages were much more difficult. However, even these problems were overcome.

The most rewarding part of the project was seeing the young students involved in the scientific method. They understood the logic of each step and how their work related to the questions we were asking.

And while we gained some valuable information on the life history of the American toad, the students' research experience became the true focus of the study.

New Development Director

Kristen Greenaway has joined the staff of Sigma Xi as the new director of development.



New Zealand born and a graduate of Waikato University, Kristen Greenaway she has an extensive background in fundraising, having headed campaigns for Cambridge University, University College London in both the UK and North America, and Erasmus University's Rotterdam School of Management.

She spent the past two years as director of events for Sally Ride Science in San Diego. The company was founded in 2001 by America's first woman in space in order to empower girls to explore the world of science and engineering.

Kristen's duties there included overseeing organization of the annual Sally Ride Science's TOYchallenge competition for middle school students. Sigma Xi has been a national TOYchallenge sponsor for three years and hosted last year's East Coast National.

Her main task at Sigma Xi will be to help expand the resources the Society can bring to bear in support of the research community.

Sigma Xi Postdoc Forum

The Sigma Xi Center will host a forum January 13-14 to promote action on Sigma Xi Postdoc Survey findings at institutions where postdocs are employed.

The forum, titled "Professionalizing the Postdoctoral Experience," will facilitate the sharing of ideas and materials and foster networking among postdocs, postdoc office personnel, funders of postdocs and policy makers. The event is funded by the Alfred

Sigma Xi News Briefs

P. Sloan Foundation, the Burroughs Wellcome Fund and the National Science Foundation.

Participants should gain a better understanding of the survey results at their own institutions, a set of baseline policy documents for use in developing their own local policies, a set of training materials from other institutions, and insight into how to get training and policies implemented. Visit www.sigmaxi.org for details.

Grant Writing Course

Sigma Xi has teamed up with The Grantsmanship Center, Inc., the nation's leading grant development training organization, to design a Sigma Xi Grant Writing Course specifically for research scientists and engineers.

The five-day course provides both novice and experienced grant-seekers practical step-by-step exercises that cover all the stages of planning

programs, locating funding sources and writing grant proposals.

Visit www.sigmaxi.org for information on courses planned in 2006 in Research Triangle Park, North Carolina, and Newport News, Virginia.

Update on Science Cafés

Science Cafés organized by Sigma Xi chapters are bringing together scientists and members of the public to talk about current scientific research, its findings, context, caveats and implications.

Fifteen-minute news segments from WGBH's *NOVA scienceNOW* have proven an effective starting point for discussion. Local PBS stations have helped promote these events.

Cafés have been organized in Minneapolis; Newport News, Virginia; San Diego; Las Cruces, New Mexico; Moline, Iowa; and Charlotte, North Carolina. Others are planned for Seattle; Durham, North Carolina; Irvine, California; and Philadelphia. Visit www.sigmaxi.org to learn more.



Intel Science Fair Sigma Xi Award Winners

More than 1,400 students from 40 countries competed at the 2005 Intel International Science and Engineering Fair in Phoenix, Arizona. Sigma Xi team awards were presented for projects that best exemplified the interdisciplinary aspects of scientific and engineering research. First place awards went to Hugo G. Chiardola and Ignacio G. Rodriguez of Viale, Entre Rios, Argentina; second place awards went to Daniel Hefter of Woodmere and Aryeh Sokolov of Plainview, New York; third place awards went to Quinn A. Morris of Troy, Courtney Fox of Oxford and May Liu of Chapel Hill, North Carolina. On the top row, left to right, are Hefter, Sokolov and Morris; front row, left to right, are Chiardola, Fox, Liu, Rodriguez and Sigma Xi Deputy Director Evan Ferguson.