

## Ensuring a Renaissance

### Perspective from a Retiring Board Member

**S**igma Xi has reached its 125th anniversary, a great achievement for any organization. Organizations with such longevity have reason to believe that they should actively resist change. Yet, the present economic stagnation, deep debt, and globalization ensure that there is no future for “business as usual.”

When I joined the Board, I saw numerous indications that the Society was moving down the wrong path—operations were rapidly eating endowment funds, the growing negative cash flow indicated pending insolvency, the Board was a house divided against itself, membership renewals were fast declining, committees were dysfunctional and results-free and transparency was absent.

Our next steps should be to accelerate the reinvention of Sigma Xi. What is clearly needed for the next few years of turnaround are at least the following strategic changes:

- 1) **Streamline** governance to facilitate, not delay change
- 2) **Reorganize** the Board to include relevant experts
- 3) **Create** an effective, new nominating committee
- 4) **Restructure** financial management to prevent recurrence of errors
- 5) **Recruit** 1000s of high-prestige researchers as members
- 6) **Increase** new member nominations from top-tier research universities
- 7) **Provide** substantial career-stage value and reason to stay active as members
- 8) **Insist** on integrity and excellence in every decision
- 9) **Develop** non-dues sources of revenues such as grants, donations and webinars.

*Martin Apple, PhD, June 23, 2011*

For the complete essay, please visit [www.sigmaxi.org/martyapple](http://www.sigmaxi.org/martyapple) •

## From the Executive Director



### Looking Back and Moving Forward

Reflecting back on this past year we have focused a lot of our attention on the celebration of the 125<sup>th</sup> Anniversary of Sigma Xi, The Scientific Research Society. I have always appreciated the original name the *Society of the Sigma Xi*, or a simple translation to *the society of companions in zealous research*. It is nearly unfathomable how much has changed over the past 125 years in the realms of scientific research and education. However, what has not changed is the necessity of all engineers and scientists to collaborate and work across diverse disciplines for advancement and achievement of specific fields.

This year *American Scientist* featured a new series of ethics columns on peer review and authorship. I hope you will read each of the six columns published this past year and share them with your colleagues, students and peers. As noted by our president Michael Crosby, “Public confidence in the fundamental truths derived from the application of science is perhaps more critical now than at any time in the Society’s history. From accuracy in reporting research to integrity in the peer review process and authorship, we have an obligation to focus on these issues.”

Even as we prepare for the future I am reminded of how fortunate I have been in my career. My major professor has been a life-long mentor. I will always be grateful to the guidance he provided at each step I took. He demonstrated the ideals we should all seek to emulate. Whom do you look up to in your professional career? Whom do your colleagues and students look up to as an example to emulate? In recent conversations with graduate students they have suggested that Sigma Xi should produce a product which could be called Graduate School 101. What has either been spoken outright or implied in these conversations is that they need more than an academic advisor—they need a mentor. It was even suggested we offer a webinar on how to be an effective mentor. I look at the pledge that we have each taken when we joined Sigma Xi and suggest that is a wonderful place to start: *encourage original investigations in science, . . . foster companionship and cooperation, . . . maintain honor, integrity and honesty in all scientific activities.*

In this issue and on the Society’s website you will find recognition of some of our “fresh faces” at Sigma Xi and distinguished members of Sigma Xi, all nominated by their fellow companions. This is not an exhaustive list because I know that many more of you devote numerous hours each year toward the mission of Sigma Xi. There is still much work that needs to be done and I encourage each of you to renew your pledge. I don’t know if there is more unethical behavior today than when Sigma Xi was founded but I do believe that public awareness of this insalubrious activity is greater today than at any time in our Society’s history. You have an obligation to the profession to promote integrity and excellence in engineering and scientific research.

As we approach the conclusion of this year celebrating Sigma Xi’s contributions to companionship in zealous research remember our careers are interdependent with others across the spectrum of disciplines. We advance science through informal and formal conversations with others—and one way that Sigma Xi is actively seeking to facilitate those conversations is through the attached white paper “Team Science: Heaving Walls & Melding Silos.” Please take a few minutes to read the attached Sigma Xi white paper, and I encourage you to share it with your colleagues.

Jerome F. Baker

## Fresh Faces of Sigma Xi

As part of the Sigma Xi 125th anniversary celebration, members were asked to recognize those students and early-career members who have shown promise in their respective fields of study and dedication to Sigma Xi. The following 15 Sigma Xi members were recognized.

**Matthew Anderson** (SX 2007), assistant professor, Department of Psychology, Saint Joseph's University

**Steven Crosby** (SX 2007), assistant professor of pharmacy practice, Massachusetts College of Pharmacy and Health Sciences

**Dalong Gao** (SX 2007), senior researcher, Manufacturing Systems Research Lab, General Motors Global Research and Development Center

**Kristian Hargadon** (SX 2001), assistant professor of biology, Hampden-Sydney College in Virginia

**Melissa Kenney** (SX 2005), assistant research scientist in Environmental Decision Analysis, Johns Hopkins University in the Department of Geography and Environmental Engineering

**Alexandra Koba** (SX 2011), student, San Francisco State University

**Matthew J. Korn** (SX 2005), Ph.D. candidate, Department of Neurobiology and Behavior, the University of California, Irvine

**Sudarshan Kurwadkar** (SX 2010), assistant professor of environmental engineering, Tarleton State University

**Yan Leyfman** (SX 2009), graduate student, SUNY at Stony Brook

**Roger J. Narayan** (SX 2006), professor in the joint department of Biomedical Engineering, University of North Carolina and North Carolina State University

**Tiffany J. Rynearson** (SX 2009), graduate student, physical analytical chemistry, San Diego State University

**Joshua Sturmfels** (SX 2010), graduate student, Industrial/Organizational Psychology, Florida Institute of Technology

**Christof Teuscher** (SX 2009), assistant professor, Portland State University with joint appointments in the departments of Electrical and Computer Engineering and Computer Science

**Lei Yang** (SX 2008), School of Engineering, Brown University

**Elsa Youngsteadt** (SX 2009), programs manager, Sigma Xi and associate editor, *American Scientist*

We invite you to read the biographical summaries for each member on our website: <http://www.sigmaxi.org/about/125th/index.shtml>. Based on the work of these newer Sigma Xi members, our future looks bright! •

## 125th anniversary

### A Milestone: 125 Years

The changes in scientific research have been extraordinary since Sigma Xi was first established. Over the past 125 years, Sigma Xi, with the help of its widespread network of chapters, has launched a great number of initiatives, programs and benefits to serve its members and educate the public at large. Yet the deepest ongoing benefit of the Society is its core values of companionship, connection and teamwork. It is an Honor Society of leading scientists focused on improving the human condition, and that is a goal that can never be accomplished working alone. The Society fosters a culture of collaboration where interdisciplinary problem solving achieves greater impact on research today, and the solutions of tomorrow.

“A lot of the really important scientific questions occur at the borders between the traditional disciplines,” says member **John Prados**. “The biggest contribution that makes Sigma Xi unique is the fact that it is an interdisciplinary organization that really tries to be interdisciplinary. It’s not just that it has members from all over the scientific community, but that it makes a conscious effort to bring those people together and have them communicate with each other on an intellectual level.”

**Jerry Baker**, executive director of Sigma Xi, views the future of scientific research as a necessary blend of disciplines, perspectives and innovation. “We cannot be lone wolves toiling in isolation. As our knowledge has grown, so has our understanding of the complexity of our universe. Our careers are interdependent with others across a vast spectrum of disciplines. We advance science through informal and formal conversations with

others—and Sigma Xi actively seeks to facilitate those conversations in new ways.

“Ideas that develop as a result of lifetime networking are examples of ‘team science.’ Teams can be loosely organized or formally mandated by regulations or grant requirements. Increasingly, they will coalesce by needs of the very issues that must be solved. However they are formed, science and engineering advance in steps both small and large because we do not conduct our research on an island.”

The way Sigma Xi members can connect today would have been perceived as science fiction when the Society was founded. Today’s web- and mobile-based social media and collaboration tools

make time zones and distances irrelevant. It’s now as easy for a scientist to collaborate across continents as it is to share ideas down the hall. These tools also allow scientists to cross disciplines and generations. Beginning and senior scientists can share experience, knowledge and capabilities that create instant synergies.

We look back with great respect on the 125 years of scientists who have been Sigma Xi members and whose contributions have created so much positive impact across so many disciplines. Now we look forward to the next generations of scientists, the next significant research and the next great advancements. As lifetime partners in the pursuit of that advancement, we look forward to that next 125 years with much anticipation. We hope you will be a part of that future.

*Sigma Xi, The Scientific Research Society 1886-2011*, published in 2011 •



## Our Distinguished Members

As part of this year's anniversary celebration, we asked our members to recognize those more established members who have demonstrated notable achievement in their field of discipline and shown loyalty and dedication to Sigma Xi during their years of membership. The following Sigma Xi members were identified by their peers.

**John Ahearn** (SX 1964)  
**Norm Augustine** (SX 1958)  
**Francisco Ayala** (SX 1964)  
**Frank Barnes** (SX 1957)  
**Kestas Bendinskas** (SX 1993)  
**May Berenbaum** (SX 1981)  
**Michael Breed** (SX 1981)  
**Thomas Budinger** (SX 1957)  
**Scott Burns** (SX 1985)  
**George Carruthers** (SX 1969)  
**Perry Chowdhury** (SX 1982)  
**Rita Colwell** (SX 1960)  
**Marlene de la Cruz** (SX 2004)  
**Casimer DeCusatis** (SX 1990)  
**Sylvia Earle** (SX 1969)  
**Marye Anne Fox** (SX 1998)  
**Bob Frosch** (SX 1951)  
**Mimi Goldschmidt** (SX 1949)  
**Fred Gould** (SX 1982)  
**Roald Hoffmann** (SX 1987)  
**John Holdren** (SX 1966)  
**Francis Howarth** (SX 1969)  
**Shirley Jackson** (SX 1968)  
**Jo Ann Joselyn** (SX 1968)  
**Dave Kasso** (SX 1963)  
**Bill Klemm** (SX 1963)  
**Larry Kushner** (SX 1948)  
**Neal Lane** (SX 1964)  
**Charles Lawson** (SX 1976)  
**Phil Lebednik** (SX 1973)  
**Ray Lutz** (SX 1967)  
**Thomas Malone** (SX 1943)  
**Linda Mantel** (SX 1964)  
**Walter Massey** (SX 1966)  
**Linda Meadows** (SX 1999)  
**Richard Meserve** (SX 1966)  
**Mario Molina** (SX 1973)  
**Gordon Moore** (SX 1953)  
**Trish Morse** (SX 1962)  
**Ben Mosier** (SX 1958)  
**Magdalena Navarro** (SX 1996)  
**Tim Ng** (SX 1979)  
**Stan Ovshinsky** (SX 1990)  
**Kumar Patel** (SX 1961)  
**Willie Pearson** (SX 1991)  
**Penny Penugonda** (SX 1993)  
**John Prados** (SX 1956)  
**Alan Preston** (SX 1969)  
**Richard Pugh** (SX 1987)  
**Peter Raven** (SX 1957)  
**Irwin Rose** (SX 1951)  
**Coby Schal** (SX 1980)  
**Roland Schmitt** (SX 1986)  
**Oliver Smithies** (SX 2009)  
**Fred Spilhaus** (SX 1961)  
**Kathy Sullivan** (SX 1989)  
**Morris Tanenbaum** (SX 1950)  
**Julio Turrens** (SX 1994)  
**Harry Weiss** (SX 1949) •

## Reflections from Members

To commemorate Sigma Xi's Anniversary, we challenged our newer members to engage more established members in brief interviews covering aspects of their careers and reflections on the Society. These interviews can be read in their entirety on the Sigma Xi website. Excerpts are as follows:

**Gregory Pope** (SX 1992), associate professor, Dept. of Earth & Environmental Studies, Montclair State University

*Interviewed By Danielle Prioleau (SX 2010), student in Environmental Studies, Montclair State University*

**Q:** What would you consider to be the most important advice you could offer a younger, upcoming scientist?

**A:** Learn how to write well and practice! Pay attention to math and chemistry. Don't be afraid to talk to people in unfamiliar disciplines. Live interdisciplinarily, though pay respect to your home discipline as well. Lastly, don't be just a scientist. Take up something else for the other side of your brain; you'll be better rounded and more attuned to society.

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**Albert A. Bartlett** (SX 1950), professor emeritus in Physics, University of Colorado  
*Interviewed by Rachel Wildrick (SX 2010), student, University of Colorado*

**Q:** What significant changes have you seen in your field during your career?

**A:** Through the years, there has been a transition into high-energy applied physics with giant accelerators. There are exciting developments in this research area.... Physics, on the whole, has moved from the small scale to the very big scale. Now we have papers authored by 30 or more authors. This would have been very rare 60 years ago.

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**Marye Anne Fox** (SX 1998), chancellor, University of California, San Diego

*Interviewed by Elsa Youngsteadt (SX 2009), programs manager, Sigma Xi and associate editor, American Scientist*

**Q:** What significant changes have you seen in your field during your career?

**A:** I'd say a shift from being a single investigator to more and more involving collaborative research. It's happening because the problems that remain in science or engineering are themselves interdisciplinary. They require expertise in things as disparate as the social sciences, chemistry, engineering and medicine.

**Larry Kushner** (SX 1948), former deputy director of the National Bureau of Standards (now NIST, the National Institute for Standards and Technology), and past president, Sigma Xi

*Interviewed by Josh Sternfels (SX 2010), graduate student, Florida Institute of Technology*

**Q:** Where would you like to see Sigma Xi in 125 years?

**A:** I would like to see Sigma Xi much more prominent at the undergraduate level. I feel that this is the key to Sigma Xi's survival, both from a membership standpoint and as a fruitful avenue for chapter activity.

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**Fred Gould** (SX 1982), William Neal Reynolds Distinguished Professor of Entomology, North Carolina State University

*Interviewed by Elsa Youngsteadt (SX 2009)*

**Q:** Where would you like to see Sigma Xi in 125 years?

**A:** That's way too far!

**Q:** How about in 25 years?

**A:** I'd like to see them still publishing *American Scientist* so I can read it on planes. If we still have plane travel. But I hope that they will continue to be involved in bringing interdisciplinary kinds of things together, keeping that broad audience.

I should not end this interview without saying that the most important thing of Sigma Xi to me in my life was the Grants-in-Aid. That's why I've always felt an allegiance to Sigma Xi, because that was the first grant I ever got. It wasn't much money but it helped me to pay an assistant when I had to take off for a weekend or something. I was working on spider mites and they just needed to be cared for all the time; it was like working with dairy cattle—you couldn't go away and you needed somebody to step in for you. That little grant went a long way, and I've always supported that part of Sigma Xi.

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**Edward A. Burke** (SX 1960) former physicist for NASA

*Interviewed by Kathleen O'Brien (SX 2010), engineer, General Dynamics Electric Boat*

*One Sigma Xi member volunteered to interview her grandfather, who is also a Sigma Xi member. Ms. O'Brien begins:*

"In a large family full of a variety of interests, my grandfather, Edward A. Burke, has always been the more science inclined member of the family.

# Sigma Xi's Ethics Symposium

November 11-12, 2011  
Raleigh Convention Center  
Raleigh, North Carolina

## Panelists

**Melissa Anderson**, Center for Bioethics, University of Minnesota

**David Baron**, Health & Science Editor, *PR's The World*

**Stephanie Bird**, Co-Editor-in-Chief of *Science and Engineering Ethics*

**Catherine Clabby**, Associate Editor, *American Scientist Magazine*

**Brother Guy Consolmagno**, Vatican Observatory

**Peggy Fischer**, Assistant Inspector General for Investigations, National Science Foundation

**Dr. Fred Grinnell**, Founding Director of Ethics in Science and Medicine Program, University of Texas Southwestern Medical Center

**Dennis Meredith**, Science communicator and author of *Explaining Research*

**Mohammed Noor**, Professor of Biology, Duke University

**Stephen Rappaport**, Moskowitz Jacobs Inc.

**David Resnik**, Bioethicist, National Institute for Environmental Health Sciences, National Institutes of Health

**William Steiner**, Dean of the College of Agriculture, Forestry and Natural Resource Management, University of Hawaii at Hilo

**Dan Vallero**, Director of the Ethics across the Curriculum Program, Duke University

**Daniel Vaszgird**, Director of Research Integrity & Compliance, West Virginia University

**Bora Zivkovic**, Blogs Editor at *Scientific American* and science blogger •

# annual meeting

## Annual Meeting and International Research Conference

In light of the ongoing need to cultivate high standards of professional ethics among all scientists, *American Scientist* featured a series of special essays throughout the year on research ethics with a focus on peer review and authorship. Expert columnists examined authors' and reviewers' roles and responsibilities in contexts such as international research collaborations, developing ethical guidelines and improving the performance of peer review.

Our discussion of this important topic will include a two-day symposium—*The Responsible Researcher: Conscience and Collaboration*—at Sigma Xi's annual meeting and international research conference in Raleigh, North Carolina, November 10-13.

This conference will bring together students, professional scientists and Sigma Xi members from North America and abroad for presentations in all fields of science and engineering, a science session on ethics, lectures by award-winning speakers and more. All sessions are open to the public and this is an excellent networking opportunity.

Undergraduate and graduate students are invited to present their research conclusions (or preliminary findings from ongoing research), participate in mentoring and networking activities, panel discussions, and other events.

Commemorative medals will be presented for outstanding research presentations.

Students present research to be evaluated by professional researchers in: Behavioral Sciences, Biochemistry, Cellular & Molecular Biology, Chemistry, Ecology & Evolutionary Biology, Engineering, Environmental Sciences, Geo-Sciences, Math & Computer Science, Physics & Astronomy, Physiology & Immunology and Interdisciplinary Research.

Through Regional and Constituency Caucuses, Assembly of Delegates, chapter training, structured networking and informal discussions, the Sigma Xi Annual Meeting offers an opportunity for delegates from Sigma Xi chapters to learn more about the Society. Delegates are able to share ideas for chapter-based activities, to learn best practices of chapter management, and to conduct important Society business impacting both chapters and individual members. The environment is further enriched through activities that foster scientific exchange.

The Sigma Xi Annual Meeting and International Research Conference is open to all interested participants. Registration is required. Please visit our website to register, and to find out more information about the ethics sessions and speakers. •

## Reflections

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Growing up, I remember detailed descriptions of the physics and chemistry behind any introductory school lesson I mentioned to him at family gatherings. I never put much thought into how he obtained his vast knowledge. I thought he was born knowing it, just like I was born not knowing it.

"It wasn't until high school, when a love of logic problems combined with a pining for New York City glamour led me to Columbia Engineering School, that I thought I might have had some of the 'thirst for knowledge' gene from my grandfather. Eventually, I earned a Masters in Engineering from MIT, and subsequently joined Sigma Xi. At the induction dinner, my grandfather, a fellow Sigma Xi member, flourished in conversation with professors and research scientists. During the dinner conversation, I learned

that my grandfather had a long and winding history in science and engineering that I had never taken the time to learn, including work at the MIT nuclear reactor, radiation research, and researching with a number of notable institutions. A few months later, I heard of the Sigma Xi 125th Anniversary interview invitation, which gave me this opportunity."

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To read her complete interview, please visit: <http://www.sigmaxi.org/about/125th/index.shtml>. On our website, you will also find an interview of Edward M. Mikhail (SX 1961) professor of photogrammetry, former head, Geomatics Engineering, Purdue University, conducted by Melissa J. Rura (SX 2010) Ph.D., Geospatial Sciences, University of Texas at Dallas, as well as an interview of Harry Weiss (SX 1949), professor emeritus of mathematics and engineering mechanics, Iowa State University conducted by Charles Strehlow (SX 2009), graduate student, Iowa State University. •