

Sigma Xi Today

Grant Application Deadline Is October 15

College students who would like funding through Sigma Xi's Grants-in-Aid of Research program need to submit their application by October 15. The application form will be on Sigma Xi's website, www.sigmaxi.org, by August 15.

Sigma Xi membership is not required to be selected for a grant, but approximately 75 percent of funds are restricted for use by dues-paying student members of Sigma Xi or students whose project advisor is a dues-paying member of Sigma Xi.

Grants of up to \$1,000 are awarded to students from all areas of the sciences and engineering. Designated funds from the National Academy of Sciences allow for grants of up to \$5,000 for astronomy research and \$2,500 for research relating to vision.

The grants may be used to pay for travel expenses to and from a research site, or for purchase of nonstandard laboratory equipment necessary to complete a specific research project.

In fiscal year 2014, Sigma Xi awarded 335 grants worth \$287,891.



GRANTS-IN-AID
OF RESEARCH
SIGMA XI

From the President

Our Efforts to Revitalize Sigma Xi

As my term as president of Sigma Xi begins, it is evident that the Society is entering a new phase of its distinguished history, but one that encompasses serious challenges including its relevance to both its current members and to scientists in general. Research scholars have long been served well by Sigma Xi's focus on promoting the highest quality scientific research in each new generation and on strongly supporting the integrity of the scientific methods practiced by all researchers. As credible understanding of science and technology becomes increasingly critical in a broad range of societal decisions, Sigma Xi is beginning to examine how its mission can be more relevant to those who are concerned not only about how research is conducted, but also about how the results of that research are used in societal decisions.

Sigma Xi has an opportunity to revitalize its mission so that it is relevant to the broadening interests of all scientists. For example, can Sigma Xi help ensure that the credible scientific understanding emerging from the quality research it has long promoted is consistently incorporated into societal decisions? The 18-month collaboration between Sigma Xi and the Institute on Science for Global Policy (ISGP) showcases an innovative approach addressing this issue. The ISGP debates will be demonstrated November 8, 2014, at the Annual Meeting (see page 397). This will provide an opportunity for Sigma Xi members to evaluate how the approach pioneered by the ISGP might benefit a revitalized Sigma Xi mission, especially for those research scientists focused on how their research is used in policy decisions.

These overarching questions concerning Sigma Xi's mission must be considered simultaneously with efforts to identify new leadership (i.e., executive director, chapter leadership, and members for the Board of Directors). In this period of rapid change, it is critical that the Society's leadership provide the innovation and energy needed to successfully meet immediate managerial needs. The leadership also needs to identify and institute modifications required to solve the Society's fundamental organizational challenges. Such changes are critical to ensuring the long and robust future of Sigma Xi as an institution noted for serving the interests of its research-oriented members and, as importantly, exploring new ways to use the remarkable achievements of scientific research to effectively meet the complex challenges facing societies, writ large.

While I have repeatedly stated my personal commitment to help lead this renaissance within Sigma Xi, my efforts can be successful only to the extent that they reflect commitments and activities from throughout the Society. While it is important that Sigma Xi remain positioned to fulfill its traditional roles in supporting research and ethical scientific practices, it is yet to be determined if it can help ensure that quality scientific research is fundamental to sound societal decisions. As president of Sigma Xi, I enthusiastically invite you to join both types of efforts in whatever ways you find appropriate.


George H. Atkinson



Sigma Xi President George Atkinson, on right, with Bobby Fong, president of Ursinus College, during the ISGP Academic Partnership conference in April 2014.

Communicating Science to the Public

Derek Muller, who makes science videos for his popular YouTube channel Veritasium, has been named a Sigma Xi honorary member. He will be a speaker November 8 during the Society's Annual Meeting in Glendale, Arizona. Fenella Saunders, managing editor of American Scientist, recently spoke with Muller about his tips for researchers who wish to share science with the public. The following are excerpts from the full interview.

Let's talk generally about why you put out these videos on YouTube. What is it that you want to accomplish?

What I want to help people do is to question their assumptions, to question the way things seem, and help them uncover the scientific truths that we've been able to discover. I also want people to embrace that kind of methodology, that kind of way of thinking, to start thinking about things more critically and more scientifically.

I wondered if you could discuss ways that scientists could help to make their research more accessible, in the sense of the common ways that scientists mess up and make their science inaccessible.

I guess the biggest thing for me is that scientists should be having conversations with people, and they should be having conversations with people outside of their field, intelligent people who are just uninformed about the area that they're researching. And I think that will give perspective about what people do and don't know ... You're always surprised by what people really think about different topics. So if you

say the word "atom" or "molecule" or "entropy" or "acceleration" and you think that that means something, because it clearly means something to you, it doesn't mean that to everyone else. And that's where you really have to be careful with science communication, is just making sure that you know the level where other people are at.

Do you think scientists should be asking more questions of the people they're talking to?

Absolutely. And I think when you're giving a talk or a lecture, there should be questions up on the slides. You should be doing a show of hands or flash cards or something. The key should be to get their opinions and get them early and then try to work with that, work that into your talk rather than just saying "this is the talk I'm going to make." This is basic communication, regardless of what you're really talking about.

There's obviously some advantages, some things for scientists to be showing their work and to be communicating more deeply about



Watch the full interview with Derek Muller at <http://bit.ly/1tNBPGx>

it that's good for them. It can feed back into their work, it can get them better grants possibly, it can get them more recognition. But some scientists still get pushback from doing things like that, even within their own departments. I wondered if you've ever talked about that with scientists and if you have any advice for them.

I can speak for my own experience and say that I wrote a PhD [dissertation] and a bunch of papers in international journals and I guess the expectation with most PhDs is that no one's ever going to read it. But I know for a fact that as a result of making YouTube videos about my PhD that many, many, many more people have read that than I ever would have thought ... When I look at my citations for the papers that I've published, I think they are way more cited than they ever would have been if I hadn't started a YouTube channel. I'm in kind of a unique area but I think that general principle holds true: You publish something in an academic journal and it may attract a bit of attention but if you can draw attention to it in other ways, you can really bring it to the top, bring it to the surface for a lot of other researchers and a lot of different disciplines, which I think can then lead to better research outcomes down the track, better citation records. As an academic, I think the strong counterargument to make is to say "this outreach that I'm doing, this communication to the public, is not just a good idea because the public are funding what I do and they should know where their money is going, but it's also a good idea because it's going to lead to better research outcomes for this institution." I think that there is a real, practical case to be made for the fact that doing outreach and communication leads to better uptake of the research that you're doing.

Sigma Xi Today is edited by Heather Thorstensen and designed by Spring Davis.



Jerry Baker Appointed Dean

Jerry Baker served as Sigma Xi executive director and chief executive officer—as well as publisher of American Scientist—from 2008 through July 31, 2014. The excerpts below were pulled from an interview with Baker about his time at Sigma Xi. Baker has returned to academia as dean of the School of Agriculture and Natural Resources at Abraham Baldwin Agricultural College in Tifton, Georgia. A new executive director is expected to be named by January.

What will you remember most about your time at Sigma Xi?

The induction ceremonies, the interactions that I've had with the many chapter members, the many visits that I've made to chapters and to speak with many members, and all the staff that I've got to work with these few years—that's what I'm going to remember the most.

What benefits do you see Sigma Xi giving to its members?

Sigma Xi is a public trust. It exists for the public benefit, not necessarily the benefit of the individual member directly, but I think there are ways that we can quantify the benefit to a member by participating and being a sustaining member of the operations. Because we

exist for the public good, we need to stand for honesty and high integrity in research. And by bestowing upon an individual the honor of membership, we're making a statement about that individual's credentials. We're saying that this individual has been an original investigator in scientific or engineering research and we found that this individual has done so with high integrity, and that they can hold themselves up higher. I think just the designation of being a member puts a little bit more on that CV that they can be proud of. Then the rest of it, I think, is the contributions that we make as members to the welfare of society ... The warm fuzzy feeling that you can have from being able to say to someone, "yes, I'm a scientist and I've done so by holding myself higher and holding my colleagues to a higher standard"—that is truly a benefit that can be internalized, if not put in the pocketbook.



Do you plan to stay involved with Sigma Xi in the future?

I'm a life member ... I plan to get involved in a local chapter. I don't think I plan to get involved too much in the national governance issues right away but I hope to participate in some of the local chapter events because I think that's where the real value of Sigma Xi exists, is at the chapter level.

Thank you very much for the opportunity to serve you and the many members of Sigma Xi these past few years.



Watch the full interview with Jerry Baker at <http://www.sigmaxi.org/news/baker-farewell>

Annual Meeting Update: Debates Hosted by ISGP



The Institute on Science for Global Policy will hold debates November 8 during Sigma Xi's Annual Meeting in Glendale, Arizona. ISGP has pioneered a specific debate format to improve communication of scientifically credible ideas and recommendations to policy makers.

Prior to the Annual Meeting, two subject matter experts will prepare concise policy position papers espousing diverse viewpoints concerning challenging priorities facing society. These papers are the centerpieces for two debates. Prior to the debates, these papers will be distributed to those in attendance.

Each author is given 5 minutes at the start of each debate to summarize his/her views while the remaining 70 minutes are open to questions from participants. The presenter and a moderator will be in the middle of a hollow rectangle, surrounded by local and potentially national policy makers,

students, and subject matter experts who will engage the authors with questions and comments. Members of the audience will have opportunities to participate through written questions.

ISGP has agreed with Sigma Xi to also organize, cosponsor, and convene two-day conferences next spring at Ursinus College in Pennsylvania and at Eckerd College in Florida. Additionally, ISGP will hold a workshop in summer of 2015 featuring ISGP-style debates and caucuses at the Sigma Xi Center in Research Triangle Park, North Carolina, for chapters who wish to explore this type of debate as an activity they can hold in their local areas.

International Research Conference Is November 7–8

Sigma Xi’s International Research Conference offers college and outstanding high school students an opportunity to present their research to respected research professionals from around the world. The conference will be held November 7–8 during Sigma Xi’s Annual Meeting at the Renaissance Glendale Hotel and Spa in Glendale, Arizona. Sigma Xi members may present their research on November 7.

Top student research presentations receive awards. Presentations are accepted in behavioral sciences, biochemistry, cellular and molecular biology, chemistry, ecology and evolutionary biology, engineering, environmental sciences, geo-sciences, math and computer science, physics and astronomy, physiology and immunology, and interdisciplinary research.

The conference also offers students the chance to hear from scientists chosen for Sigma Xi’s 2014 awards, attend workshops to improve career skills, and meet graduate school recruiters and potential employers. Social events during the conference will provide opportunities for students to meet distinguished scientists.

Sigma Xi membership is not required. However, students must register and receive approval on a preliminary abstract to participate. Registration opened August 1 at www.sigmaxi.org.

Sigma Xi members may volunteer to judge student presentations by e-mailing Kevin Bowen at kbowen@sigmaxi.org.

Chronicle of The New Researcher Publishes First Article

Sigma Xi’s new journal, *Chronicle of The New Researcher*, achieved a major milestone in July by publishing its first article! The article was written by Rema Shah, a student at Raleigh Charter High School in Raleigh, North Carolina.

Any pre-collegiate student worldwide is welcome to submit their outstanding research manuscript related to science, technology, engineering, or math at www.ctnr.org. The majority of manuscripts that will be accepted for publication will come from secondary school students, but exceptional work by younger students will be considered.

Chronicle of The New Researcher is an online, refereed journal that helps prepare students for careers as professional researchers by giving them experience in publishing a manuscript. Sigma Xi members may volunteer to review students’ manuscripts and guide them through the publishing process. Those who wish to be a mentor-reviewer should contact ctnr@sigmaxi.org.

Publishing in *Chronicle of The New Researcher* does not require any fees from the students or their schools. Initial funding was provided by DIRECTV and Sigma Xi. DIRECTV recently provided its second year of support for the project with a \$100,000 gift.



Rema Shah

Check Out the New SigmaXi.org

Sigma Xi’s redesigned website is expected to launch in August at www.sigmaxi.org. Look for these new features:

- Sigma Xi’s first online member directory,
- An improved online process for nominating new members,
- Professional collaboration platforms: Look for a feature called “Communities.” These virtual spaces will allow members to share updates and conversations. All Sigma Xi members will be automatically added to a general member community and to an e-mail list to receive updates about community activity. Members will have the option to change their e-mail settings if they wish. Chapter officers will also get their own community.

Thank You, Beta Testers!

Sigma Xi members volunteered to test the new site during the beginning of August. These volunteers will earn a Super Beta Test Team ribbon for their profile. Thank you for improving our new website!



Meet Your Fellow Companion: Avinash Konkani

Sigma Xi's motto is the Greek "Spoudon Xynones," or "Companions in Zealous Research." With that thought in mind, we like to highlight fellow companions to learn more about their work and what the honor of induction to Sigma Xi has meant for their careers. Avinash Konkani (SX 2013) is researching how to create a better environment for hospital patients and the clinicians who provide them care.*

Tell us about your educational background including your doctoral research.

I completed my bachelor of engineering degree in biomedical engineering in 2001 in first class with distinction from Karnatak University, India. I came to the United States and obtained my MS in biomedical engineering with emphasis on human factors engineering from Wright State University in Dayton, Ohio, and went back to India in 2005. I worked in India from 2006 to 2010 as a biomedical engineer and assistant professor of biomedical engineering. I came back to the United States in the fall of 2010 and since then I have been a full-time PhD student in systems engineering at the Department of Industrial and Systems Engineering at Oakland University in Rochester, Michigan. In March 2014, I joined the University of Virginia Health System in Charlottesville, Virginia, as a clinical engineer. I am expecting to graduate in fall 2014 from Oakland University.

Tell us about something we might see in our daily lives that directly correlates to your work.

My research area is human factors in the healthcare system and it has a direct impact on patient safety and oc-

cupational safety of clinicians. There has been an increase in the noise level in intensive care units and operating rooms. Additionally, there is an increased number of false alarms—which are alarms that are clinically insignificant—from the medical devices in the ICUs. These factors have become performance obstacles for the nursing staff and they reduce patient safety. An increase in noise also has a deleterious effect on patients' healing processes and physiology. It increases the duration of a patient's stay in the hospital. I am working to find the best possible low-cost methods to reduce hospital noise levels and the number of false alarms so as to provide a better healing and work environment for the patients and the clinicians.

In my current position as clinical engineer at the University of Virginia Health System, I am responsible for managing the healthcare technology. Along with working on different healthcare technology projects, I am involved in patient safety, medical device accident/failure investigation, providing in-service teaching, and

training the end users of medical devices.

Describe your publishing experience.

From my experience as an author as well as a junior associate editor of *IEEE Journal of Translational Engineering in Health and Medicine*, I have learned that we should not lose heart if

an article gets rejected from a peer-reviewed journal. Instead, take it positively, make the corrections, update your article, and send it to the next journal on your list. Before submitting the article, make sure that the objective of that journal suits the objective of the research being published. If in doubt, send the abstract to the managing editor and get an opinion.

What has the honor of induction into Sigma Xi meant to you?

I came to know about Sigma Xi from Oakland University's chapter. OU's chapter conducts seminars and I went to attend one of the seminars last year and I really learned a lot about the Society. Since then, I was excited to become a member of Sigma Xi. It is an honor to join the group of elite professionals in science and engineering.

What advances do you see in your field over the next 100 years?

Hospitals are getting transformed into healthcare systems, which increase the complexity of the system. We need to keep things simple enough so that we can avoid errors and build a safe work environment. On the other hand, many patients are getting treatment at home, so home healthcare is becoming a challenge. I can see great research work in these two sectors of healthcare.

**This represents the year a member joined Sigma Xi. Read the full interview with Avinash Konkani at <http://www.sigmaxi.org>.*



Meet Your Fellow Companion: Siddharth Tripathi

Siddharth Tripathi (SX 2013) is using natural compounds to find new treatments for fungal infections.*

Tell us about your educational background including your doctoral research.

I earned a MS and PhD in botany from Lucknow University in India. After qualifying for a research fellowship from the Council of Scientific & Industrial Research, the leading Indian R&D organization, I joined the Plant Gene Expression Laboratory at the National Botanical Research Institute in Lucknow for doctoral research. My doctoral research was in the plant biotechnology area and was focused on discovering genes involved in abscission, a process by which plant parts are shed to discard unwanted parts or allow for seed dispersal. By utilizing the rose as a model plant, I identified several novel genes involved in petal abscission.

What is the focus of your current research?

At present, I am working as a postdoctoral research associate at the National Center for Natural Product Research within the School of Pharmacy of University of Mississippi. The overall goal of my research work is to discover new drugs for treating fungal infections that

occur in immunocompromised patients. By utilizing natural compounds that are present in plants, animals, and microbes, this work has the potential to identify novel drug molecules that are safer, less toxic, and work through novel mechanisms compared to currently used antifungal drugs. My work is focused on identifying the molecular mechanism by which these drug molecules kill fungal cells.

Tell us about something we might see in our daily lives that directly correlates to your work.

Fungal infections such as athlete's foot and yeast infections are all too common, and current treatments cannot adequately eliminate these infections. In addition, fatal fungal infections occur in cancer patients undergoing chemotherapy and also in patients undergoing organ transplantation and aggressive surgery. Current antifungal drugs are few and have several limitations such as an inability to cause complete killing of some fungi, as well as toxicity and resistance. Therefore, new drugs are needed that are less toxic, more efficacious, work through a novel mechanism, or that can be used in combination with existing drugs to overcome drug resistance.



What has the honor of induction into Sigma Xi meant to you?

It's a great privilege to be a full member of Sigma Xi. Sigma Xi is a global platform to promote scientific innovativeness and encourage a sense of teamwork among scientists; being a full member makes me more responsible and dedicated to my research. I feel proud to be a member of a community of renowned scientists including several Nobel Prize laureates. Being a member, I had the wonderful opportunity to serve as a judge for Conrad Foundation's 2014 Spirit of Innovation Challenge, a competition for students from around the world.

What advice would you give a young researcher just starting out in your field?

Have single-minded dedication toward the goal to get success. Research is an exciting journey. Be honest with yourself, have patience, and develop skills to think differently.

What advances do you see in your field of research over the next 100 years?

I believe that the discovery of new antifungal drugs, especially with the help of novel genomic and genetic technologies, will provide solutions to find effective treatment and prevent the ever-growing worldwide problem of invasive fungal infections.

**This represents the year a member joined Sigma Xi. Read the full interview with Siddharth Tripathi at www.sigmaxi.org.*



Give us an example of how multidisciplinary research directly contributes to your work.

In our team, chemists isolate natural products from living organisms. The microbiologists check the efficacy of these natural compounds against fungal pathogens, and finally I, as a molecular biologist, contribute by finding the mechanism of action of these natural compounds. I believe that the contributions of all team members are absolutely essential for the success of this project.