

Sigma Xi Today

A NEWSLETTER OF SIGMA XI, THE SCIENTIFIC RESEARCH HONOR SOCIETY

Important Upcoming Dates for Sigma Xi

SPRING NOMINATIONS: Who will you nominate for Sigma Xi membership this spring? Nominations require two nominators. Sigma Xi staff can help you find a second nominator if you need one. <https://www.sigmaxi.org/become-a-member#nominate>

MARCH 6: Students in high school through graduate school may register and submit an abstract by March 6 to compete in the online Student Research Showcase in April. <https://www.sigmaxi.org/srs>

MARCH 15: Undergraduate and graduate students may apply by March 15 for research funding from the Grants in Aid of Research program. <https://www.sigmaxi.org/giar>

APRIL 23–26: Sigma Xi is a proud sponsor of the USA Science & Engineering Festival in Washington, DC to celebrate STEM outreach. <https://usasciencefestival.org>

MAY 12–13: Members in the Anaheim, California, area are invited to judge for Sigma Xi's \$6,000 in awards to high school students at the Regeneron International Science and Engineering Fair (previously Intel ISEF). In alignment with Sigma Xi's goal to promote interdisciplinary research collaborations, the Society awards students whose projects are the best demonstrations of teamwork in the life science and physical science categories. <https://www.sigmaxi.org/volunteer>

Sigma Xi Today is managed by Heather Thorstensen and designed by Dena Verdesca.

From the President

Measuring Research Impact

There are a multitude of reasons one aspires to become a scientist or engineer. The opportunity to use our technical expertise to improve the human condition is often what keeps us going. Often this impact is not realized until years or even decades later.

In today's competitive workplace, we increasingly seek to measure this impact with quantifiable metrics. In some circles such as academia, the number of research papers published and citations of these papers, translated to a term called H-index, is a measure often used to assess research productivity and significance. The "impact factor" of the journal in which these papers appear is an additional metric to gauge the influence or importance of one's work. Such metrics, however, do not capture the broader impact beyond the publishing arena.

Moreover, the research community is increasingly concerned about the detrimental effects of overusing citation metrics. Eugene Garfield, the legendary information scientist responsible for the science citation analysis, has called these metrics "rather dubious." May Berenbaum, editor-in-chief of *Proceedings of the National Academy of Sciences*, recently noted that the use of such simplistic measures for determining the true impact of a piece of work is problematic. She writes that it is particularly troublesome when used as a predictor of potential career success in hiring, promotion, and funding of early career researchers. Furthermore, she believes that a heavy reliance on such numbers bypasses the important evaluative effort that involves a more time-consuming balanced analysis of the individual's articles and importance to the field.

We at Sigma Xi, as an honorary research society, view impact as much broader than H-indices and citation numbers. As our mission statement reflects, we see our members having an impact not only in their research ventures but also by enhancing the overall health of the research enterprise. We are comprised of members who view an impactful career as one that nurtures the next generation of scientists. Many members provide science outreach activities in their communities and developing countries around the world. Those involved in science policy are affecting legislation that is technically informed and guided by fact and not guesswork. And let us not forget the impact of Sigma Xi's volunteers who ensure the success of the Society's programs, such as awarding students with research grants or providing distinguished lecturers.

There is no better time than now for Sigma Xi members to discuss with students, colleagues, and friends the multitude of methods of using our scientific knowledge and expertise to make a difference—including defining and embracing impact in the broadest sense. That's who we are.



Geraldine Richmond

Geraldine Richmond
Geraldine Richmond

Sigma Xi Chapter Helps Students Become Researchers

After reactivating the Sigma Xi chapter at Northeastern University in Boston, Massachusetts, undergraduate students are focusing on two programs to help other students become better prepared for research careers.

“Our goal is to bring curious students into the world of scientific research, to instill honorable research values in them, help them build the fundamental skills needed to be a great researcher, and support them in future research endeavors,” chapter leaders Zipei “Shirley” Liang, Alexandra Spak, and Hannah Carrow wrote.

In September 2019, their Research Immerse Program placed 16 freshmen and sophomore Northeastern students into seven groups, based on topics the students cared about. Each group met every other week for

workshops, assignments, and advice from a chapter associate member, who mentored the groups. Having practiced reading scientific papers, thinking critically, and synthesizing ideas, they will write a literature review or systematic review that they will turn into a poster and present at a university expo in April.

The chapter’s Think Like a Scientist! program kicked off in January to encourage students in grades 4–6 to pursue interests in science, technology, engineering, and math (STEM). Chapter executive board members Whitney Kuwamoto, Alexandra Spak, and Claire Williams developed the curriculum and built relationships with schools. A grant from the university’s Office of Undergraduate Research and Fellowships paid for supplies such as

lab notebooks.

The chapter trained associate members and other undergraduate students as mentors. During meetings with students through April, these mentors will talk about real-life scientists that represent different career paths and diversity in STEM and give a short lesson that relates to real-world applications; the students will complete a hands-on activity or design challenge in small groups. The chapter expects the Think Like a Scientist! program to reach up to 24 grade-school students in its first semester.

“We hope that upon completion of the program, these students gain an appreciation for scientific research and discovery and understand that anyone can become a scientist,” the program leaders wrote.

Call For Nominations: Elections

Sigma Xi, The Scientific Research Honor Society is seeking nominations for qualified candidates to fill the president-elect’s position and vacancies for representation of regions and constituencies for terms beginning July 1, 2021. Only active, full Sigma Xi members are eligible for office. An inactive member may become active at any time by paying dues.

President-Elect: Election to this position carries a full three-year term, each year with a distinct title plus duties and responsibilities. Failure to complete any part of the three-year term will end the term in full.

President-Elect: *July 1, 2021–June 30, 2022*

President: *July 1, 2022–June 30, 2023*

Past President: *July 1, 2023–June 30, 2024*

Please submit nominations for the president-elect position to elections@sigmaxi.org by March 2, 2020.

Positions listed below carry a three-year term of July 1, 2021–June 30, 2024.

Board of Directors:

- Baccalaureate Colleges Constituency
- Canadian/International Constituency
- Northwest Region
- Southeast Region

Associate Directors:

- North Central Region
- Southwest Region

- Membership-at-Large Constituency
- Research & Doctoral Universities Constituency

Committee on Nominations: This is a three-year term beginning immediately following the 2020 elections.

- Mid-Atlantic Region
- Northeast Region
- Area Groups, Industries, State & Federal Laboratories Constituency
- Comprehensive Colleges & Universities Constituency

Please submit nominations for the Board of Directors, associate directors, and Committee on Nominations to elections@sigmaxi.org by June 30, 2020.

You may visit <https://www.sigmaxi.org/2020-elections> for a list of duties and responsibilities for each position. Self-nominations are welcomed and will be considered. The election of candidates will take place immediately following the Sigma Xi Annual Meeting in November 2020.

Grants in Aid of Research Recipient Profile: Surbhi Sharma



Grants: \$575 in spring 2013 and \$400 in fall 2014

Education level at the time of the grant: PhD student

Project: The focus of the project was to identify and curate a database of the novel and the existing carboxyl (C-) terminal minimotifs in the human proteome, which includes all proteins expressed in a human cell. Humans have an estimated 2 million types of proteins encoded by 20,000–25,000 genes in a human cell. The C-terminal minimotifs, also

called short linear motifs, are short stretches of 3–15 contiguous amino acid peptides found exactly at the C-terminal region at the end of all proteins with a known molecular function in at least one protein. These functions include binding to other molecules and trafficking of proteins to specific cellular compartments (PMID: 31106589). Minimotifs are important to study; in some cases, a single point mutation in minimotifs can diminish their function, causing various diseases with implications in neurodevelopmental disorders (PMID: 30225339).

Sharma and her colleagues' preliminary studies identified approximately 3,500 experimentally validated C-terminal minimotifs, representing roughly 13 percent of the human genome. Through computational analysis, they further catalogued approximately 9 million possible C-terminal minimotifs in the human proteome. They published their findings, "The Functional Human C-Terminome," in *PLOS ONE* (April 6, 2016). They also built a C-terminome web application (<http://cterminome.bio-toolkit.com>) to disseminate the data on C-terminal minimotifs. Users can use this application to identify the C-terminal minimotifs

in their proteins of interest. The team is currently testing hundreds of predicted C-terminal minimotifs through experimentation that will give us a better sense of the human proteome.

How the project influenced her as a scientist: "It is important to ask the right questions in order to make meaningful contributions to the society through science," Sharma said. "Science is not just done for the sake of discovery or innovation. The implications of good, solid research contribute to the society much beyond what one can even imagine. What might seem to be an insignificant work, for any given reason, is often helpful in building up a bigger and better work. Collaborating with experts and using advanced technologies is the only way to add value to science."

Where is she now? Inducted into Sigma Xi in 2013, Sharma is now a postdoctoral fellow in Edwin Oh's Lab of Neurogenetics and Precision Medicine at the Nevada Institute of Personalized Medicine, where she is investigating the genetic and structural variants that contribute to rare genetic disorders.

STEM Art and Film Festival Brings Science to the Public

The Sigma Xi STEM Art and Film Festival on November 17 in Madison, Wisconsin, celebrated the visual arts as a tool that can help the public learn about science, technology, engineering, and math.

Featuring approximately 30 pieces of art and 10 films, the public festival was the final event of the Society's Annual Meeting and Student Research Conference. The festival included a screening of the Emmy Award-winning Netflix documentary *Chasing Coral*, science talks, and exhibit booths.

Kim Moss, an assistant professor of Art and Visual Culture at Iowa State University, won the Best Art Award from both the judges and the attendees. Her installation, *The Landscapes Within*, is three visualizations using LED lights of various colors to depict enlarged cellular processes of healing and disease.

"I'm interested in teaching people how to do positive things in the environment and change their lifestyle habits to motivate positive change in their health and their



Ruthie Hauge Photography

lives," Moss said. "And so I think biomedical art is a very strong way to bring them into those topics of science and medicine."

The next Sigma Xi Annual Meeting and Student Research Conference is this November in Alexandria, Virginia, and will include an art exhibit.

Annual Meeting and Student Research Conference Addressed Our Changing Global Environment



Ruthie Hauge Photography

Vint Cerf of Google, left on stage, answers questions from NPR science correspondent Joe Palca and the audience after his talk at the Annual Meeting and Student Research Conference.

Sigma Xi members, science supporters, and students came together in Madison, Wisconsin, on November 14–17 for the 2019 Sigma Xi Annual Meeting and Student Research Conference. The theme was *Our Changing Global Environment: Scientists and Engineers Designing Solutions for the Future*.

The conference began with a business meeting for delegates who represented 74 chapters and the Membership-at-Large Constituency of the 133-year-old honor society for scientists and engineers. Delegates heard updates from Society leaders and president-elect candidates. They discussed business of the Society and recognized recipients of chapter awards.

The conference's plenary speakers included Vint Cerf, vice president and chief internet evangelist at Google, who discussed how the internet and computational modeling are tools for understanding the effects of climate change. Another plenary speaker, May Berenbaum, professor and head of entomology at the University of Illinois at Urbana-Champaign, gave an update on the insect apocalypse. Additional speakers included all but one of Sigma Xi's 2019 award winners; Gordon Moore, cofounder of Intel and the 2019 Gold Key Award recipient, spoke to attendees via prerecorded remarks. Breakout sessions related to the meet-

ing theme were organized by tracks for water, life and health, and energy. Other tracks were related to Sigma Xi's mission to support the research sector, with sessions on research ethics, science communication, and professional development. Keynote speakers were Peter Hotez of Baylor College of Medicine, Tim Donohue of the University of Wisconsin–Madison, Joe Palca of NPR, Dietram Scheufele of the University of Wisconsin–Madison, Kim Cobb of Georgia Institute of Technology, and Joseph Cotruvo of Joseph Cotruvo and Associates.

Approximately 170 high school, undergraduate, and graduate students

attended the meeting and 140 research projects were presented during a poster session and oral presentations. Top presenters received a medal, monetary award, and nomination to Sigma Xi membership with their initiation fee and first year of dues paid.

The meeting concluded with a new event, the STEM Art and Film Festival, which invited the public to learn about science, technology, engineering, and math through the visual arts.

*The 2020 Annual Meeting and Student Research Conference will be held November 5–8 at the Hilton Alexandria Mark Center in Alexandria, Virginia. The theme will be *Hacking the Brain: The Intersection of Art and Neuroscience*. <https://www.sigmaxi.org/amsrc20>*



A student presents her research poster at the Student Research Conference.