

## Peter H. Raven to Receive 2013 McGovern Award

Sigma Xi is proud to announce that botanist **Peter H. Raven**, world-renowned champion of conservation and biodiversity, is the 2013 Sigma Xi John P. McGovern Science and Society Award recipient.



A native Californian, Dr. Raven received his Ph.D. from the University of California, Los Angeles in 1960 after completing his undergraduate work at the University of California, Berkeley. Following several years as a member of the Department of Biological Sciences at Stanford University, Dr. Raven moved to St. Louis in 1971 to become Director of the Missouri Botanical Garden and Engelmann Professor of Botany at Washington University. For four decades, Dr. Raven has headed the Missouri Botanical Garden, an institution he nurtured into a world-class center for botanical research and education, and horticultural display. He retired as president in 2010 and has assumed the role of president emeritus and consultant through 2014.

Described by *Time* magazine as a “Hero for the Planet,” Raven is known for his passion for conservation and his efforts to ensure the continuation of research around the world in order to preserve endangered plants. He is considered a leading advocate for conservation and a sustainable environment.

In recognition of his work in science and conservation, Dr. Raven has also been the recipient of numerous prizes and awards, including the prestigious International

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## From the President



### Time Flies

I am amazed to be writing my final words for *American Scientist* during my year as President of Sigma Xi. There have been times when the year seemed like it would last forever, and times when it seemed like it couldn't possibly be moving so quickly. Though in all honesty, because of publication schedules, I still have a few months left to serve. The reality is that time is slipping away rapidly, and I'm realizing I will not be able to accomplish everything I would like to do. It is frustrating, but I know I have given my best and will continue to do so and I appreciate all the help from members and staff I've gotten during the year.

Pondering what I have and haven't done this year led me to reflect on all the things that had happened during the year in science. I realized that I am constantly seeing “science fiction” become our reality.

When I was a kid, I was the remote control for the television and sometimes the antenna too, but there were only a few channels anyway. Now, we have countless ways to receive visual media wherever we are, and the change is breathtaking.

I remember getting my first computer when I was in high school—I was really excited because it had 64K of RAM and two floppy drives. That thing got me through college and part of graduate school, and yet now it is dwarfed many times over by my cell phone.

I recall my first mobile phone. It was kind of clunky and all it did was make phone calls. Now my phone is barely used for phone calls (I honestly don't like talking on the phone), as it is one of my primary access points to the web and other mobile tools like email and twitter. I haven't had a land line since 1997.

In graduate school the world-wide-web and e-mail were only just becoming ubiquitous. Now it's impossible to remember what it was like to not have immediate access to information, and I feel cut off when I am somewhere that I can't just pull out my tablet or phone and jump online if I have a question I want answered immediately.

I don't point this all out in a “get off my lawn” moment. I am still young! I fully expect to live at least fifty more years—possibly more. So, what I am wondering is this: what other amazing changes will I get to see come to fruition? I couldn't have predicted, most likely, all that I have seen thus far. Thinking about it, we usually ask “where are the flying cars” or something similar, and yet if you're keeping up you know that self-driving cars are coming fast! There is a solar powered plane that can fly all day and night. What else will the scientists and engineers of the future develop?

It's our job as “companions in zealous research” to help foster that next generation of researchers. We need to make sure they have the tools, training, and public support (financial, yes, but science and engineering also need to be valued by society) to bring about all of the currently unimaginable advances in technology we will one day no doubt come to take for granted and wonder how we lived without.

So get out there and have the conversation that helps someone make a breakthrough. Enjoy your time with colleagues and students talking science.

And someone, please, make a transporter. I really need one.

Thanks for reading,  
Kelly O. Sullivan

## Are you a SmartBrief subscriber?

**M**ore than 22,000 of your fellow Sigma Xi members and friends currently subscribe to our daily, free SmartBrief newsletter—are you one of them? Subscribe today and get the best of science, technology and engineering news delivered to your inbox each day! For more details, visit [www.sigmaxi.org/smartbrief](http://www.sigmaxi.org/smartbrief) •

**SIGMA XI SmartBrief**

## New Publication Planned

**E**ach year thousands of secondary students are recognized for the quality of their investigations by numerous philanthropic organizations and private foundations, as well as at regional science fairs and competitions. Yet at present, limited national, let alone international, publication opportunities exist to gather and publish the best original research of secondary students in the science, technology, engineering and mathematics (STEM) areas.

In response to this need, Sigma Xi is developing a **refereed, online journal** for these young researchers. The journal will offer a web-based outlet for mentor-enabled preparation, review, and publication of original research by high school students in STEM. The journal's website will eventually serve as a base for social networking among students and mentors and will provide educational support for students and teachers learning how to plan, execute, and communicate original scientific research.

We are very grateful to DIRECTV, the leading sponsor for the development of this new publication. DIRECTV's primary area of philanthropic focus is K-12 education, including emphasis on STEM education through strategic partnerships that foster student learning across the Americas.

The steps leading to publication will provide invaluable learning experiences in scientific communication for high school students and help to further their interests in the sciences. The process will also strengthen their applications for further studies, provide opportunities for them to interact with STEM professionals and fellow high school students interested in their area of research, and allow them to communicate their work to a broad audience.

We look forward to identifying student research worldwide, providing mentor support for the development and submission of research reports, follow up with the students upon their receipt of feedback from experts during the revision process, and ultimately publish the best papers on a continual basis in a high quality, polished online publication.

For more information please contact the publication's project director Richard Wiggins at [rwiggins@sigmaxi.org](mailto:rwiggins@sigmaxi.org) •

## Save the Date & Spread The Word!

**Sigma Xi's 2013 Student Research Conference** will be held **November 8th-9th** in **Research Triangle Park, NC**.

For more information, please visit our website at [www.sigmaxi.org](http://www.sigmaxi.org) •

## Rita Colwell Addition

The editors of *Sigma Xi Today* regret that in our coverage of 2013 Procter Prize winner **Rita Colwell**, we neglected to include that Dr. Colwell faithfully served Sigma Xi in the capacity of President from 1991-1992. We apologize to Dr. Colwell and thank her for her years of dedicated service to Sigma Xi. •

## Raven Receives Award

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Prize for Biology from the government of Japan and in 2001, the United States National Medal of Science—the country's highest award for scientific accomplishment. Over the course of his career, he has also held Guggenheim and John D. and Catherine T. MacArthur Foundation fellowships.



Under President Bill Clinton, Dr. Raven served on the Committee of Advisors on Science and Technology. In addition, he served for 12 years as home secretary of the National Academy of Sciences, and is a proud and dedicated member of the Academies of Science in Argentina, Brazil, China, Denmark, India, Italy, Mexico, Russia, Sweden, the U.K., and several other countries.

In addition to his many publications, both popular and scientific, Raven co-wrote *Biology of Plants*, an internationally best-selling textbook, now in its sixth edition. He also co-authored *Environment*, a leading textbook on the biodiversity of our planet.

**Dr. Raven also served the capacity of President of Sigma Xi Society from 2003-2004.** Following his time in that leadership role in 2007, he spearheaded Sigma Xi's collaboration with the United Nations Foundation (UNF) on *Confronting Climate Change: Avoiding the Unmanageable and Managing the Unavoidable*, a report that outlined a roadmap for preventing unmanageable climate changes and adapting to the degree of change which can no longer be avoided. Dr. Raven co-chaired the international panel of expert scientists responsible for composing the report along with Rosina Bierbaum, former dean of the University of Michigan's School of Natural Resources and the Environment and John Holdren, director of Woods Hole Research Center. •

## Science Across Borders 2013

Sigma Xi President, **Kelly O. Sullivan** and fellow co-chair, **Hans B. Püttgen** of the Energy

Center, EPFL cordially invite you to attend a two-day science meeting in Lausanne, Switzerland this summer.

Beginning on June 4th, Sigma Xi is hosting **Science Across Borders**—a meeting that will bring together interested students, professional scientists, Sigma Xi members, and the public. There will be various feature sessions including Science and Development; Science and Diplomacy; and Science, Technology and Peace Building. There will also be evening events that take advantage of the beautiful surroundings of EPFL and Lausanne, Switzerland.

Among the featured speakers, Sigma Xi is excited to include **Dr. Romain Murenzi**, the Executive Director of the Academies of Science for the Developing World; **Dr. Bernard Amadei**, the founder of Engineers without Borders; **Dr. Alice Gast**, current President of Lehigh University and a Science Envoy; **Dr. E. William Colglazier**, Science and Technology Adviser to former Secretary of State Hillary Clinton; and **Dr. Sheldon Himelfarb** of the U.S. Institute for Peace.

We hope you will consider joining us for this insightful discussion on the future of science and engineering on the international level. •



## Sigma Xi Members Receive Nobel Prize

Sigma Xi members **Dr. David J. Wineland (SX 1979)** and **Dr. Lloyd Shapley (SX 1950)** were honored this past year by the Royal Swedish Academy of Sciences in Stockholm, Sweden with the Nobel Prizes in Physics and Economics, respectively.

David J. Wineland was recognized for the Nobel Prize in Physics along with Serge Haroche from the College de France and Ecole Normale Supérieure in Paris, France for their mutually “ground-breaking experimental methods that enable measuring and manipulation of individual quantum systems.” Wineland and Haroche are close friends, and systems developed by the two have been called, by their Nobel citation, “the very first steps towards building a new type of super-fast computer based on quantum physics.” Wineland’s advancements in physics have focused mainly in the field of optics, specifically applying laser cooling techniques of ions and the use of trapped ions in the implementation of quantum computing systems.

Wineland is currently employed at the National Institute of Standards and Technology (NIST) in Boulder, Colorado and is the fourth Nobel Prize recipient in physics for that institution in the last 15 years.

Lloyd Shapley won the Nobel Prize for Economic Sciences for his work on “the theory of stable allocations and the practice of market design” along with Alvin E. Roth of Stanford University. Among his many achievements, Shapley is best known for

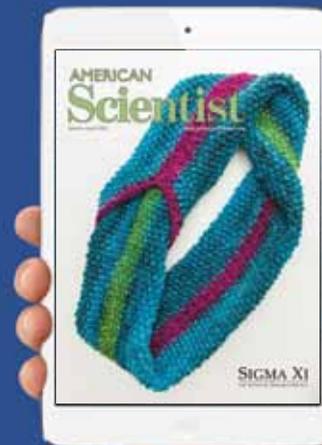


his work in game theory, and multiple theorems carry his name including the Shapley value (a solution concept in game theory); the Bondareva-Shapley theorem (which implies that convex games have non-empty cores); the Shapley-Shubik power index (for weighted—or block voting power); and the Gale-Shapley algorithm (for the stable marriage problem). He currently serves as professor emeritus at the University of California, Los Angeles.

It is interesting to note that Shapley’s connection to Sigma Xi began long before his own induction into the Society at Princeton University in 1950. His father, Harlowe Shapley, served as president of Sigma Xi in the early 1940s and played a central role in the renaming of this publication from *Sigma Xi Quarterly* to *American Scientist*. Harlowe Shapley also created a special endowed fund within Sigma Xi’s Grants-In-Aid Program specifically for students either at Harvard University or at institutions in the Boston area. •

## Coming soon... American Scientist iPad App!

We are excited to announce that with the launch of the July–August issue of *American Scientist* magazine, members will have access to a FREE, state-of-the-art electronic application for iPads. •



# meet your fellow companion

## Meet Your Fellow Companion: Joannes Paulus Yimbessalu



*Sigma Xi members hail from diverse fields of academia, government, and industry. Our motto is the Greek "Spoudon Xynones," or "Companions in Zealous Research." With that thought in mind, each issue in Sigma Xi Today, we like to take the time to highlight a different "Fellow Companion"—to learn more about their work and what the honor of induction into Sigma Xi has meant for their career.*

**T**his issue, we are excited to feature **Joannes Paulus Yimbessalu**—a Research Technologist II at the Medical College of Wisconsin and an Associate Member of Sigma Xi. Yimbessalu received his Masters degree from New Mexico Highlands University (NMHU) in 2011. A long devoted biologist and humanitarian, Cameroon native Yimbessalu's current work with mice reproductive systems has him positioned at the forefront of research in the expanding field of human infertility.



### Do you have a particular teacher or professor who inspired your love of science? Why?

My love for science, especially biology, started back in high school. The professors that have inspired my academic career include my advisor, Dr. Carol Linder, and also Dr. Dick Green, the professor with whom I worked as a teaching assistant while at NMHU. Over the last two years, I have worked in Dr. Linder's lab focusing my work on male infertility. Both of these professors believed in my abilities to succeed in the field of science from the beginning, and have been especially understanding of the challenges one faces when moving into a new environment with a completely different culture.

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

Despite the fact that the majority of infertility cases have unknown (idiopathic) origins, most occur as the result of environmental pollutants and lifestyle influences. It is also known that certain chemical agents can alter the genetic make-up of cells within the body, which might lead to infertility. In most industrialized countries, facilities like laboratories in the workplace have some exposure levels of radiation materials, despite the fact that there are guidelines established by the public safety department that protect employees.

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

Being part of the Sigma Xi scientific research community is by invitation and my active participation during the NMHU Sigma Xi chapter meetings and events on campus as a graduate student earned my induction. Joining this great scientific community has given me the exposure to certain mentors, all of whom I look up to as a career scientist. I am also proud to say that since beginning my involvement with Sigma Xi, I have received several awards from conferences I attended namely; the Larry Ewing Memorial Trainee Travel Fund and the Lalor Foundation Merit Award during the 2011 Society for the Study of Reproduction (SSR) Annual Meeting which took place in Portland, Oregon in 2011.

### Has Sigma Xi helped further your career? If so, how? If you haven't started your career yet, how do you believe Sigma Xi will serve you in the future?

Sigma Xi has absolutely helped to further my career. The funding I received from Sigma Xi helped my research significantly, as I was able to purchase animals for my research study, and I have had the opportunity to present my work at several conferences—namely the Society for Study of Reproduction, the New Mexico Annual Bioinformatics Symposium on Post Genomic Technologies for Biologic Discovery, and IDeA Networks of Biomedical Research Excellence.

### What is your favorite motto?

I actually have two favorite mottos. The first, from John F. Kennedy's Inauguration speech in 1961: *"My fellow Americans, ask not what your country can do for you, ask what you can do for your country"*. And the second, I coined myself during my involvement with humanitarian organizations that help children attain their maximum potential in life: *"When you protect a child, you protect a generation."*

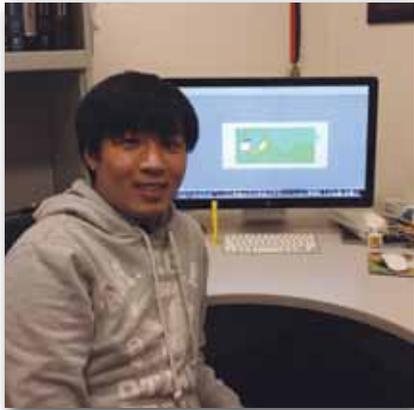
### What advice would you give a young researcher just starting out in your field?

Research requires honesty, humility, trust, and above all, patience. Any aspiring young scientist needs to have these qualities in order to succeed. There will be times when you may see no growth or future success in the kind of research you do, and in such situations, take a break, rethink and hang in there, because someday your discovery might change lives and the research community at large. •



Please note that the text above is just a small excerpt of all Yimbessalu had to say in response to our questions. To read his interview in full, please visit Sigma Xi's website at <http://www.sigmaxi.org>.

# meet your fellow companion



## Meet Your Fellow Companion: James Chen

**T**his issue, we are excited to feature **Dr. James Chen**, currently an assistant professor of mechanical engineering and materials science at The Pennsylvania State University, the Altoona College (PSU-Altoona), and a Full Member of Sigma Xi. Dr. Chen received his Ph.D. from The George Washington University in 2011 and prior to joining PSU-Altoona, worked as a Visiting Assistant Professor at Indiana University-Purdue University, Fort Wayne. His research is both timely and important in today's scientific world—as he applies physics to renewable energy applications, especially in the areas of wind and solar power.

### What is the focus of your current research?

Currently, I am focusing on the design of a wind energy harvester and a nano-antenna solar energy harvester.

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

When you stop at the red light, do you see the light pole vibrating due to the transverse wind? That is called vortex-induced vibration (VIV). The most famous story that references this topic, tragically, is of the Tacoma Bridge in Washington State. In my wind energy research, our team is devoted to designing a device to acquire the energy behind VIV using computational fluid dynamics and an in-house-developed software for mechanical design.

### Describe the patent/publishing experience—were there any bumps along the way for you?

I have published papers in various fields, including microfluidics, biosensors, multi-scale mechanics, fracture mechanics, computational fluid dynamics and theoretical mechanics. The first published paper is always the most difficult. It took me several weeks just to consider the structure. I had so many materials I wanted to put in the

manuscript. At the same time, I felt it might not be good enough. My Ph.D. adviser, Dr. James Lee, told me, “Just state your purpose clearly and tell people what you want to say. As long as you make your point, let the reviewers and editors worry about the rest of it.” It has helped me a lot and has been my motto for both my research and my life.

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

When I was first inducted into the Sigma Xi Chapter at GWU, I felt that I was being recognized for the honor of both the greater scientific Society and for my contributions to society at large as well.

### Has Sigma Xi helped further your career? If so, how? If you haven't started your career yet, how do you believe Sigma Xi will serve you in the future?

I have been reading *American Scientist* since I became a Sigma Xi member. By reading *American Scientist*, I am aware of research advances throughout the world and how we, as scientists or engineers, communicate our science to society as a whole.

### What is your favorite motto?

*“Anyone who has never made a mistake has never tried anything new.”*  
- Albert Einstein (SX 1921)



### When you're not working on your research, what do you do in your free time?

I love playing basketball and softball during the summer, and working out in the gym during the winter. Exercising helps me clear my mind and reorganize my thoughts.

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

Do what you say you will do and say what you will do. Always prepare yourself for the next challenge and never step back when it comes. •

Please note that the text above is just a small excerpt of all Dr. Chen had to say in response to our questions. To read his interview in full, please visit Sigma Xi's website at <http://www.sigmaxi.org>.

## National Academy of Engineering Elects 22 Sigma Xi Members

**T**wenty-two Sigma Xi members were among the 69 new members and 11 foreign associates elected in February to the National Academy of Engineering.

**Anant Agarwal (SX 1993)**, president, edX (online learning initiative of MIT and Harvard University), and professor, electrical engineering and computer science department, Massachusetts Institute of Technology, Cambridge. For contributions to shared-memory and multicore computer architectures.

**James M. Anderson (SX 1959)**, Distinguished University Professor, and professor of pathology, macromolecular science, and biomedical engineering, Case Western Reserve University, Cleveland. For contributions to understanding tissue/biomaterials interactions for designing and testing medical devices.

**Joseph J. Beaman Jr. (SX 1986)**, Earnest F. Gloyne Regents Chair in Engineering, mechanical engineering department, University of Texas, Austin. For innovation, development, and commercialization of solid freeform fabrication and selective laser sintering.

**Lorenz T. Biegler (SX 1981)**, Bayer Professor of Chemical Engineering, Carnegie Mellon University, Pittsburgh. For contributions in large-scale nonlinear optimization theory and algorithms for application to process optimization, design, and control.

**Donna G. Blackmond (SX 1986)**, professor of chemistry, Scripps Research Institute, La Jolla, Calif. For kinetic and mechanistic studies of catalytic organic reactions for pharmaceuticals, and for studies of chiral amplification.

**Craig T. Bowman (SX 1975)**, professor of mechanical engineering, Stanford University, Stanford, Calif. For contributions to understanding pollutant formation processes in combustion systems to reduce harmful emissions.

**Weng Cho Chew (SX 1981)**, professor, department of electrical and computer engineering, University of Illinois, Urbana. For contributions to large-scale computational electromagnetics of complex structures.

**Charles F. Gay (SX 1986)**, president, applied solar division, Applied Materials Inc., Santa Clara, Calif. For leadership in the development of the global photovoltaic industry.

**Joseph P. Heremans (SX 1989)**, Ohio Eminent Scholar, professor of mechanical and aerospace engineering, and professor of physics, Ohio State University, Columbus. For discoveries in thermal energy transfer and conversion to electricity, and for commercial devices employed in automobiles.

**Maurice Herlihy (SX 1980)**, professor of computer science, Brown University, Providence, R.I. For concurrent computing techniques for linearizability, non-blocking data structures, and transactional memory.

**Carl C. Koch (SX 1959)**, Kobe Steel Distinguished Professor of Materials Science and Engineering, North Carolina State University, Raleigh. For synthesis of amorphous and nanocrystalline alloys by mechanical attrition.

**Vijay Kumar (SX 2012)**, UPS Foundation Professor, School of Engineering and Applied Sciences, University of Pennsylvania, Philadelphia. For contributions in cooperative robotics, networked vehicles, and unmanned aerial vehicles, and for leadership in robotics research and education.

**Enrique J. Lavernia (SX 1982)**, dean, College of Engineering, and Distinguished Professor of Chemical Engineering and Materials Science, University of California, Davis. For contributions to novel processing of metals and alloys, and for leadership in engineering education.

**Raphael C. Lee (SX 1981)**, Paul S. and Allene T. Russell Professor of Surgery, Medicine, Organismal Biology and Anatomy, University of Chicago, Chicago. For contributions to understanding cell injury associated with trauma including electrical shock and thermal burns.

**Gerald H. Luttrell (SX 1990)**, A.T. Massey Coal Company Professor of Mining and Minerals Engineering, Virginia Polytechnic Institute and State University, Blacksburg. For advancing separation technologies for the mineral and coal industries.

**John A. Montgomery (SX 1988)**, director of research, U.S. Naval Research Laboratory, Washington, D.C. For leading the Navy's electronics-warfare technical authority, and for developing critical operational systems.



**José M.F. Moura (SX 1971)**, University Professor, department of electrical and computer engineering, and director, Information and Communications Technologies Institute, Carnegie Mellon University, Pittsburgh. For contributions to the theory and practice of statistical signal processing.

**Richard M. Murray (SX 1986)**, Thomas E. and Doris Everhart Professor of Control and Dynamical Systems and Bioengineering, California Institute of Technology, Pasadena. For contributions in control theory and networked control systems with applications to aerospace engineering, robotics, and autonomy.

**Thomas J. Overbye (SX 2001)**, Fox Family Professor in Electrical and Computer Engineering, University of Illinois, Urbana-Champaign. For the integration of visualization and analysis tools for power systems.

**Pradeep S. Sindhu (SX 1984)**, vice chairman, chief technical officer, and founder, Juniper Networks, Sunnyvale, Calif. For contributions to technology and commercialization of Internet Protocol routing.

**William A. Thornton (SX 1970)**, corporate consultant, Cives Engineering Corp., Roswell, Ga. For rational methods of designing steel connections, and for leadership in steel building design.

**Sharon L. Wood (SX 1990)**, Robert L. Parker Sr. Centennial Professor and chair, department of civil, architectural, and environmental engineering, University of Texas, Austin. For design of reinforced concrete structures and associated seismic instrumentation for extreme loadings and environments. •