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Charles N. Haas Named Clarke Laureate for Microbial Risk Research

by Wendy Plump, COE Staff Writer

A few months ago, when Chuck Haas walked to a podium in Irvine, California to receive one of the world's most prestigious water research prizes, he gave a lecture that sounded a bit like the plot for a thriller movie. He described real-world, waterborne villains like Legionella and non-tuberculosis Mycobacterium and the scientists who seek to thwart them in an ongoing, high-stakes, international crusade for water safety. Turns out, that is a pretty apt description.

Charles N. Haas, PhD, the LD Betz Professor of Environmental Engineering and department head for Civil, Architectural and Environmental Engineering (CAEE), is one of the biggest players in that global drama. The National Water Research Institute (NWRI) recently recognized his status with its highest accolade, the 2017 Athalie Richardson Irvine Clarke Prize, for pioneering methods to assess and minimize health risks caused by waterborne pathogens.

Haas' Quantitative Microbial Risk Assessment (QMRA) approaches, introduced in the early 1980s, are the gold standard for calculating the concentration of disease-causing microorganisms in water. The QMRA methodology allows authorities to set standards that characterize microbial risks accurately, and to frame policy around targeted mitigation goals.

The Clarke Prize is one of just a handful of international water prizes. As a Clarke laureate, Haas received a $50,000 cash award and a medallion marking the achievement. The ceremony was attended by colleagues from around the country with whom Haas has worked for decades.


Dr. Charles Haas

"Professor Haas' accomplishments are exceptional and impact a broad number of scientific fields," said NWRI Executive Director Kevin Hardy. "His research has led to a better understanding of what is safe when it comes to our water, how we address emerging pathogens, and how we control risks to human health, thereby upholding NWRI's mission to ensure that safe, reliable sources of water are available now and for future generations." The NWRI is based in Fountain Valley, California.

Former CoE Dean Joseph B. Hughes, a distinguished professor with CAEE, said Haas' achievements cannot be underestimated. "This award is really, really a big deal - you cannot receive a higher honor in his area of work. Chuck's work has been felt, truly, around the globe in assuring the safety of water to billions of people.

"And I think the legacy of Dr. Haas' education of Drexel students is widely felt in municipal water sectors, in academia around the United States, and in practicing professionals of the environmental engineering profession," Hughes added.

During the award lecture in California, Haas described a world beset by pathogens that enter the water supply through a number of pathways. Outbreaks of disease and sickness remain a concern and the types of microorganisms that cause them are increasing, including those that are resistant to antibiotics, infecting new populations, and, in the wrong hands, potential agents of bioterrorism.

Haas recalled a conversation in 1978 with a dean from another institution who told him that environmental engineers would be obsolete within 25 years because the world's environmental problems would all have been solved by then. The problems are still here. Fortunately, so are the environmental engineers.

AN INTERDISCIPLINARY STUDENT

An early predictor of Haas' achievements can be found in his interdisciplinary education. He received an undergraduate degree in biology and graduate degrees in environmental engineering. Fittingly, his Clarke Prize lecture was titled "An Engineer to Microbiologists, and a Microbiologist to Engineers."

"I think that kind of education was essential. Environmental engineers, almost by virtue of what we do, draw on a lot of disciplines on a need-to-know basis," Haas said. "So that was really one of the themes of my talk, how we've incorporated different streams of knowledge into solving water problems. Early on, we studied things like hydraulics and fluid mechanics, and then it became chemistry and microbiology and public health, and on and on. And it's still continuing. "Students should prepare for their careers by exposing themselves to fundamentals in a diversity of fields, because you never know what you're going to be working on in the future. They need to have breadth to communicate with other professionals.

"I work at the intersection between water, microbiology and health. And so it's really at those intersections that you get important problems to solve. That's where you can invent something that hasn't been looked at before."

Haas' Clarke Prize follows a long line of achievements. The insignia after his name reflect a startling range of academic titles: PhD., F. AEESP, BCEEM, F ASCE, F AAAS, F AAM, F IWA, and F SRA. Along with his over 220 publications, professional alliances and consulting activities, advisory memberships, regular appearances in the national news media-coupled with a very active twitter feed-the credentials point to a singular scientist at the pinnacle of a ranging, multidisciplinary 40-year career.

At the very outset of that career, Haas was aware of the limited approaches public health officials used to assess pathogen risk in water supplies. His first groundbreaking publication came in 1983, when he posited that a single ingested microorganism had the potential to cause disease. His argument torpedoed the extant definition of "safe" when treating water supplies for human consumption. He continues to question that threshold today.

"I never use the word safe; I use the word 'acceptable,' " he said. "You can never assure zero risk. You can never assure 100% safe."

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Haas went on to do important work with the United States Environmental Protection Agency as it addressed outbreaks of giardisis, developing a "dose response" function for the pathogen Giardia. After his seminal work on QMRA was published in 1999, the World Health Organization used it to develop global drinking water standards. Today, Haas is known as the "Father of QMRA."

ON THE HORIZON

Haas said water safety is one of the most pressing national and global challenges going forward. Globally, several billion people face an inadequate and unhealthful water supply.

In the United States, the deterioration of water delivery systems remains one of the largest threats to water safety. Maintenance and rehabilitation and "reinvention" are ongoing needs. Storm runoff and inadequate cleanup efforts have allowed groundwater contaminants from years and decades past to continue menacing public water supplies. Each year brings another disease-bearing microorganism surging into the limelight.

For example, scientists are waging an accelerating fight against Legionella bacteria, which entered the national lexicon in 1976 with the death of 22 individuals from Legionnaire's disease at a luxury hotel here in Philadelphia. In fact, Haas was recently appointed to serve on a new National Academy of Sciences, Engineering and Medicine committee on "Management of Legionella in Water Systems." He also has a multi-year project proposal pending with Virginia Tech to obtain data and set standards to target Legionnaire's disease.

Haas is optimistic about future water safety developments, he said, because local officials are taking greater leadership roles in addressing local and regional problems.

"We're re-entering the stage where rather than so much activity being driven by federal requirements, more and more state and local units of government are the driving forces," said Haas. "We've been working continually in this area.

"Here we're blessed, because the Philadelphia Water Department is one of the best water agencies in the country," added Haas, who lives in the city. "But we also have right nearby both the American Water Company and Aqua America, the number one and number two investor-owned water utilities. In fact, Aqua has a number of Drexel alumni in its leadership. We have good relationships with both of them."

The NWRI was founded in 1991 by a group of Southern California water agencies in partnership with the Joan Irvine Smith and Athalie R. Clarke Foundation to promote the protection, maintenance, and restoration of water supplies and to protect the freshwater and marine environments through the development of cooperative research work. The Clarke Prize was established in 1993.

Professor Simi Hoque to be Honored at Girls Inc. 2018 Strong, Smart, and Bold Breakfast

Girls Inc. will honor Dr. Simi Hoque, Associate Professor of Architectural Engineering, along with Monica Malpass, News Anchor from 6ABC Live Action News, and Emily Bittenbender, Managing Partner of Bittenbender Construction, LP, for their many inspirational achievements.

Dr. Simi Hoque

Before coming to Drexel in September, 2016, Dr. Hoque created and organized an outreach program with Girls Inc. of Holyoke, MA and the University of Massachusetts - Amherst, which was very successful. She ran her first summer STEM camp at Drexel with Girls Inc. last year, where 6th to 8th grade girls from Philadelphia came to Drexel's campus to learn about different STEM subjects from professors and graduate students.

Congratulations to Dr. Hoque on this extraordinary achievement.

CAEE Student Awards

Yetunde Sorunmu (pictured right), a Ph.D. student in Environmental Engineering, has received funding from the NSF to take a six-month internship at the USDA-ARS government laboratory in Wyndmoor, PA. Yetunde will conduct experimental research to upgrade a fast pyrolysis residue to "green coke." The INTERN fellowship was awarded as a supplement to Professor Sabrina Spatari, Grace Hsuan, and Yaghoob Farnam's NSF EAGER grant, SPORA, that aims to produce lightweight aggregates from coal bottom ash waste.

Yetunde Sorunmu

Patrick Stoehr

Patrick Stoehr (pictured left), an Architectural Engineering undergraduate student and member of Dr. Yaghoob Farnam's research group, received the Office of the Provost and the Steinbright Career Development Center Co-op Award. This award will support his research in Dr. Farnam's lab on geopolymer concrete during the spring and summer terms of 2018.

Professor Christopher Sales Awarded $200,000 from Department of Defense

by Dr. Chris Sales

Dr. Christopher Sales

I was recently awarded $200,000 of funding from the Department of Defense's (DoD) Strategic Environmental Research & Development Program (SERDP) for a one-year seed project on developing applications of non-thermal plasma technologies for the removal of poly- and perfluorinated alkyl substances (PFASs) from investigation-derived wastes. I am the PI on this grant and my co-investigators include researchers at Drexel's C&J Nyheim Plasma Institute (Professor Alexander Fridman and Associate Research Professor Alexander Rabinovich) and Assistant Professor Erica R. McKenzie from Temple University.

PFASs are a diverse set of ionic organofluorine surfactants. Due to their ionic functional group and carbon-fluorine (C-F) backbone, these compounds exhibit useful physical and chemical properties, such as hydrophobicity and oleophobicity, and thus have been used in a variety of industrial and consumer applications for over 50 years. For example, many water- or stain-repellent fabrics, such as GORE-TEX® , Polartec® or those treated with Scotchgard®, contain PFASs. Teflon, which is used as a coating for many non-stick cookware, is also a PFAS compound (polytetrafluorethylene, PTFE). Even some paper-goods used for food packaging, such as dessert and bread wrappers, sandwich and burger wrappers, and microwaveable popcorn bags, are coated with PFASs to prevent water and oil from seeping through.

Concern regarding PFAS has increased across public, regulatory, commercial, and academic sectors due to a growing body of evidence suggesting some PFAS are persistent, bioaccumulative, and toxic. Many US and international governing bodies have begun establishing regulations for select PFASs. The US EPA established a drinking water health advisory for the two PFASs, perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA). Unfortunately, PFOA and PFOS contamination is wide-spread with millions of American's drinking water exceeding the lifetime health advisory concentration, with water treatment options for these compounds being extremely limited.

PFASs are a major concern for DoD because of its historic use in aqueous film forming foam (AFFF), which was used to extinguish fuel-based fires. In addition to former and current military sites, AFFF has also been used to suppress fires at many airports and by some municipal firefighting agencies to fight structural fires and wildfires. PFASs can now be detected in soils, sediments, surface waters (lakes and streams), and groundwater at and surrounding sites where AFFF has been used.

The strong C-F bonds of PFASs, which make them useful for their commercial and industrial applications, also make them extremely persistent in the environment. Although activated carbon and resins, like those found in Brita(R) filters and home filtration systems, can remove PFASs from water, they cannot destroy these compounds and are expensive. Many forms of conventional and advanced water treatment technologies are unable to completely degrade these compounds. Only a small number of technologies have shown promise in degrading PFASs, with one of those including the use of plasma. The project aims to further advance the application of plasma technology to improve remediation of PFASs. The project combines the expertise of environmental engineers with those of the plasma researchers.

Professor Joseph Mullin Retires After 50+ Years of Teaching

After serving over 50 years in Drexel University's Evening College and then the Department of Civil, Architectural and Environmental Engineering, Professor Joseph Mullin celebrated his retirement at Drexel's 2017 Service Recognition Luncheon on Friday, December 8, 2017, at the Sheraton Philadelphia Downtown Hotel.

Dr. Mullin with President John Fry

Dr. Mullin began his career at Drexel after graduating from the Civil Engineering program in 1956. That year, he was recruited to teach those returning from Korea on the G.I. Bill. He taught for 11 years, and during that time, earned his MBA and M.S. in Civil Engineering from Drexel. From 1962 to 1964, he attended Penn State, where he was awarded a National Science Foundation Graduate Research Fellowship and earned his Ph.D. in Civil Engineering.

After receiving his Ph.D., Dr. Mullin was promoted to an Associate Professor and continued to teach in the Evening College. He took a position with General Electric in Valley Forge, PA to conduct research on composite materials. It was during this time period that Dr. Mullin had to give up teaching for one year to work in Baltimore, MD for GE. In 1973, he became the Director of Engineering at the engineering firm, Proctor and Schwartz, in North Philadelphia. After spending 13 years there, he became Vice President for Hudson Engineers from 1986 to 1990. From 1990 to 1998, he was the Senior Vice President for Pennoni Associates.

When Dr. Mullin retired from industry in 1998, he was still teaching in the Civil Engineering and Construction Management Program in the Evening College. It was at this time, he was recruited to run the Construction Management Program, which he did until 2001. The program grew so much under his leadership that it was made into a full time day program. Dr. Mullin moved into the Civil, Architectural, and Environmental Engineering Department in 2001 and became an Associate Department Head. In 2014, he was promoted to Full Teaching Professor.

During his tenure at Drexel, he received various awards, including the Laura S. Campbell Award for Excellence in Teaching, the Samuel Mercer Jr. Teaching Award, The Stanley J. Gwiazda Professorship, the Joseph S. Mozino blue and Gold Award, the Lifetime Achievement Award in Construction Management, and the 2006 College of Engineering Service Award.

Congratulations to Dr. Mullin on his retirement!