# Water from Air: Anytime, Anywhere

Joseph Priestley Society

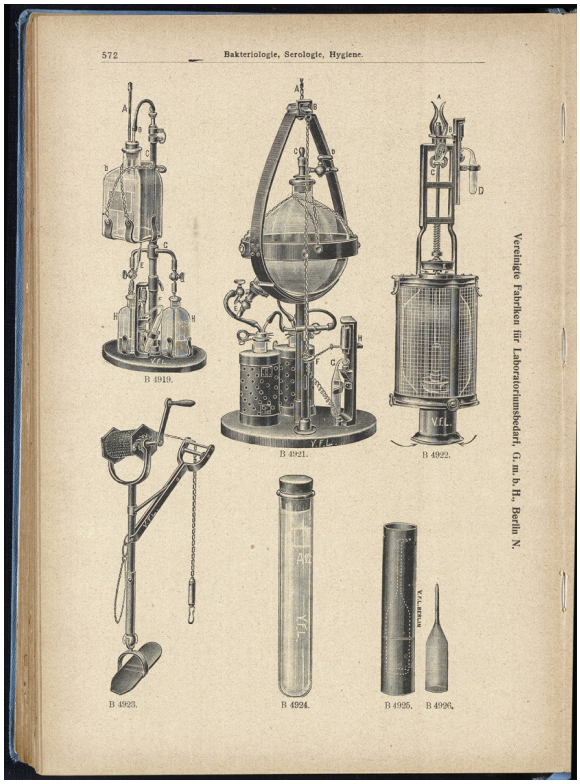
**Thursday, September 22, 2022**

1:00 p.m.–2:00 p.m. EDT (UTC -4)

Register to Attend

## The new season of our Joseph Priestley Society virtual talk series kicks off with a discussion on how metal-organic frameworks can ease water shortages by extracting it from the air.

Water is essential to life. It is estimated that by 2050, nearly half of the world population will live in water-stressed regions due to arid conditions or lack of access to clean water. This presentation outlines the parameters of this vexing societal problem and presents a solution to the global water challenge.




Apparatuses for water collection and extraction, from *Preis-Verzeichnis über Apparate und Gerätschaften für alle Laboratoriums-Arbeiten im Gebiet der Biochemie*, 1913.

*Science History Institute*

There is plenty of water in the air that can potentially be harvested not only from the desert atmosphere, where the humidity is low, but also from more humid regions of the world where clean water is needed. In principle, the materials used to harvest water from air in these climates should be applicable to deployment anywhere in the world to extract atmospheric water at any time of the year.

Metal-organic frameworks (MOFs) have emerged as a unique class of porous materials capable of trapping water at relative humidity levels as low as 10%, doing so with facile uptake and release kinetics. From laboratory testing to field trials in the driest deserts, kilogram quantities of MOFs have been tested in several generations of devices. The initial results of these experiments showed that MOFs could capture water from desert climates and deliver over one liter per kilogram of MOF per day. More than an order of magnitude increase in water productivity could be achieved with members of the MOF family when employed in an electrified device operating at many cycles per day.

The presentation will show that the vision of extracting clean water from air anywhere in the world at any time of the year is potentially realizable with MOFs, and so is the idea of giving "water independence" to the citizens of the world.

## About the Speakers


Omar Yaghi.

**Omar M. Yaghi** is the James and Neeltje Tretter Chair Professor of Chemistry at the University of California, Berkeley. He is widely known for pioneering metal-organic frameworks and covalent organic frameworks. These materials have the highest surface areas known, making them useful for hydrogen and methane storage, carbon capture and conversion, water harvesting from desert air, and catalysis, among others. His approach has led to an exponential growth in the creation of new materials. He termed this field *reticular chemistry* and defines it as "stitching molecular building blocks into extended structures by strong bonds."

Yaghi is an elected member of the U.S. National Academy of Sciences, the German National Academy of Sciences Leopoldina, and the Islamic World Academy of Sciences. He is an honorary member of the Indian Academy of Sciences. He has also been honored with many awards, including the Materials Research Society Medal, American Chemical Society Award in the Chemistry of Materials, King Faisal International Prize in Science, Albert Einstein World Award of Science, BBVA Foundation Frontiers of Knowledge Award in Basic Sciences, Wolf Prize in Chemistry, ENI Award for Excellence in Energy, Gregori Aminoff Prize by the Royal Swedish Academy of Sciences, August-Wilhelm-von-Hofmann-Denkmünze of the German Chemical Society, Royal Society of Chemistry Sustainable Water Award, and VinFuture Prize for Emerging Science and Technology.

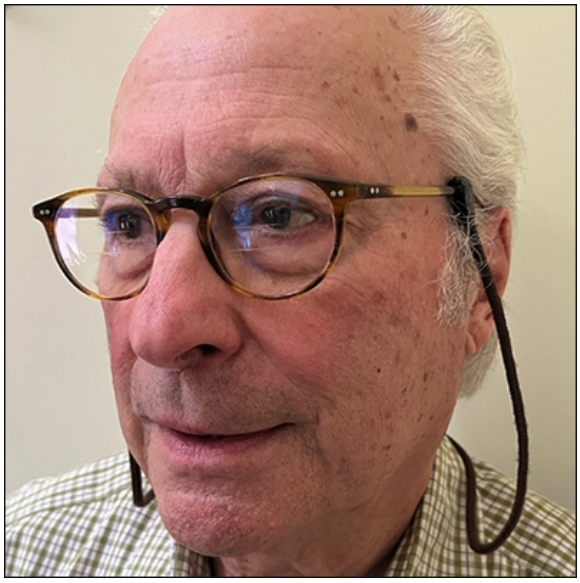

David Moore.

**David R. Moore** is the carbon capture technology leader at GE Research. He leads a disruptive technology portfolio with a mission to accelerate the development and deployment of novel engineered material system solutions for atmospheric water extraction and a zero-carbon emissions future.

He is the principal investigator on AIR2WATER, a four-year program with the Defense Advanced Research Projects Agency. Partnering with Yaghi at UC Berkeley, as well as with the University of South Alabama and the University of Chicago, the team aims to develop a sorbent-integrated prototype that extracts water from the air and produces 150 to 500 liters per day of potable drinking water.

Moore is a classically trained organic/polymer chemist developing novel material systems and has 12 external publications and 21 granted U.S. patents. He holds a PhD in organic chemistry from Cornell University and a BA in chemistry from Drew University.

## About the Moderator


Daryl Boudreaux.

**Daryl Boudreaux** provides nanotechnology commercialization and business development consulting services primarily to entrepreneurs and start-up companies through his comapny Boudreaux and Associates.

Before moving to the Philadelphia area, he established and led the technology transfer office at Rice University. He started 13 new companies there in 6 years, 9 based on Rice nanotechnology inventions. He founded the Rice Alliance for Technology and Entrepreneurship in partnership with Rice's School of Business.

Previously, Boudreaux established and led the Office of Technology Transfer for the Stevens Institute of Technology. He worked at AlliedSignal for 25 years, beginning his career there as a physicist doing research in materials science and chemistry, and later becoming a senior executive in the Corporate RD&E organization. Before that he was an associate professor of physics at the Polytechnic University of New York and was a postdoctoral research associate at the Cavendish Laboratory of Cambridge University.

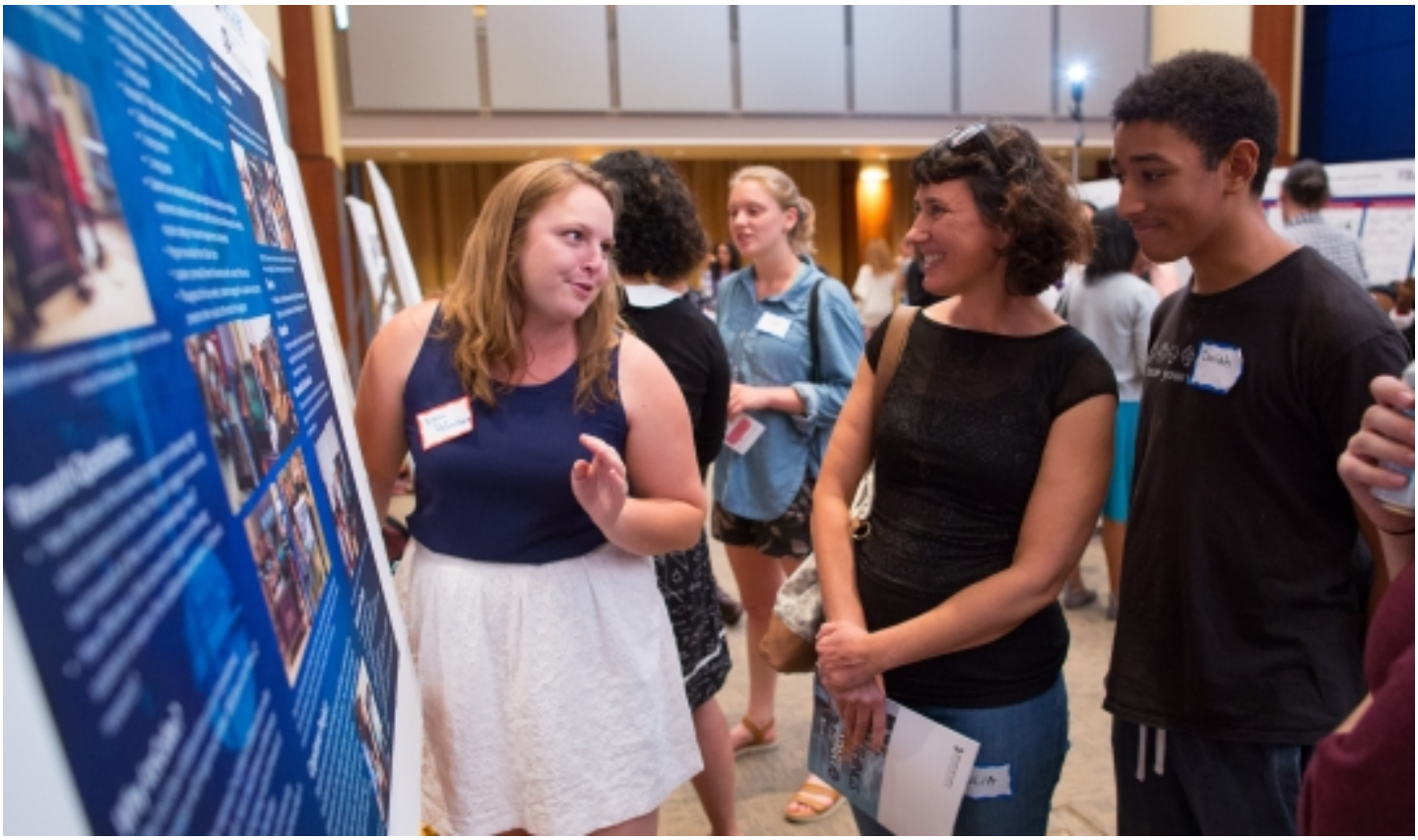
Boudreaux earned his PhD in physics from Pennsylvania State University. He is a native of New Orleans, where he earned his BS in physics at Loyola University.

## About the Series

The Joseph Priestley Society (JPS) promotes a deeper understanding of science, technology, and industry, with an emphasis on innovation and entrepreneurship. Speakers are leaders from a wide variety of chemical and life science companies and the financial, consulting, and academic communities.

**For more information about this event, please contact jps@sciencehistory.org.**

UPCOMING EVENTS



## Start Talking Science

PUBLIC EVENTS

### September 22, 2022

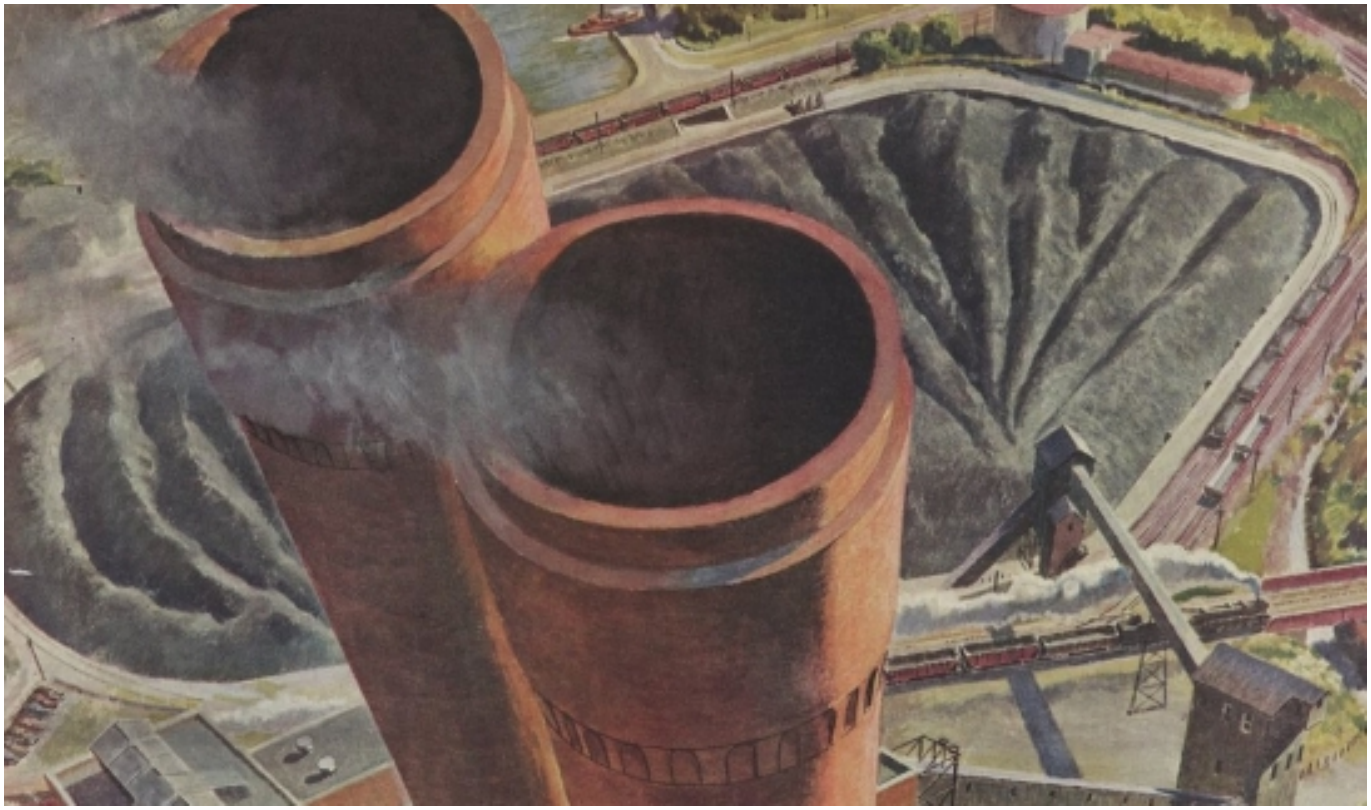
Spend an evening nerding out with local scientists and researchers about astronomy, medicine, oceanography, and more. ... *Read More*

## Delaware River Festival

PUBLIC EVENTS

### September 24, 2022

Institute staff will be on hand at the 4th annual celebration of the mighty Delaware with some fun, water-themed activities and giveaways. ... *Read More*



## Science & Activism Tour

MUSEUM PROGRAMS & ACTIVITIES

### September 24, 2022

From Rachel Carson to ACT UP, explore how scientists and activists have shaped discovery and created change. ... *Read More*



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