



THE NUCLEUS

March 2019

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Monthly Meeting

2018 Richards Award to Chad A. Mirkin at Harvard

Who Was Theodore William Richards?

By M. S. Simon

Volunteering with the United States Pharmacopeia

By Chris Moreton

Carolyn R. Bertozzi to Receive 2019 Esselen Award



Who was Theodore William Richards?

by M.S. Simon

Adapted from *The NUCLEUS*, 1996 (3) 4 ff

The first award of what, at that time, was known as the Theodore William Richards Gold Medal (the medal is still gold, with a silver replica for informal display) was made to Arthur Amos Noyes in 1932. The Section Chairman, William Ryan, introduced the occasion with the following quotation by Henry Watterson:

*A mound of earth a little higher graded
Perhaps upon a stone a chiselled name,
A daub of printer's ink soon blurred and
faded
And then — oblivion. That — that is
fame.*

Ryan went to point out that Watterson, as an observer in national politics, had developed a cynical attitude toward self-seeking politicians, and Ryan contrasts the impermanence of reputation of such with the seekers of truth for truth's sake for whom true fame is imperishable. With reference to Richards he said, "True fame ... lives on, not merely to perpetuate the name of the individual and his accomplishments, but rather to inspire and encourage others who are serving similar ends."

But in our age, when only "fifteen minutes" of fame are allowed, it behooves us to keep alive the names and accomplishments of our predecessors in chemistry. The Northeastern Section has many great chemists, but the earliest of the internationally renowned was Theodore William Richards. His Nobel Prize in Chemistry, awarded in 1914, was the first given an American chemist.

He was born in Germantown in 1868, was educated at home by his mother, a poet, and his father, a marine artist. He became interested in science at the age of six when he was shown the

rings of Saturn through a four-inch telescope by Professor Josiah Parsons Cooke, Jr. of Harvard while the family was at Newport, R.I.

At ten he was making Pharaoh's Serpents with mercuric thiocyanate and coloring flames with various salts. He obtained money to set up a chemistry laboratory when he was 13 by printing on a hand press, copywriting, and selling an edition of his mother's sonnets.

He was allowed to attend chemistry lectures at the University of Pennsylvania, and at 14 entered and studied chemistry at Haverford. He received the Bachelor of Science at 17. He went to Harvard to study under Cooke and received a Bachelor of Arts and, at 20, after a year of very difficult research in which he demonstrated exceptional experimental skills in determining the atomic weight ratio of oxygen to hydrogen in water, earned the Ph.D. degree.

A year in Europe gave him the opportunity of studying analytical techniques at Göttingen and visiting important laboratories in Germany, France, England, and Switzerland.

He returned to Harvard in 1889 as an assistant and remained there for the rest of his years. When Cooke died, in 1892, Richards, already an assistant professor, was sent to Ostwald at Leipzig and Nernst at Göttingen to prepare himself to become the instructor in physical chemistry. His rise to full professorship at Harvard in 1901 came quickly, when Göttingen attempted to recruit him.

His early work centered one what at the time was one of the major scientific problems, that of determining exact atomic weights. He explained his choice, "not merely because I felt more competent in that direction than in any other, but also because atomic weights seemed to be one of the primal mysteries of the universe. They are values which no man by taking thought can change. They seem to be independent of place and time. They are silent witnesses of the very beginnings of the universe, and the half-hidden, half-disclosed symmetry of the periodic system of the elements only enhances one's curiosity about them. Moreover, among the many properties possessed by an element, the atomic weight seems one of the most definite

and precise. Hence, in trying to satisfy a desire which had as its object the discovery of more knowledge concerning the fundamental nature of things, one naturally assigns to the atomic weights an important place."

In the following years Richards and his students (if we include independent work of Baxter and Hönigschmid, who had been trained by him) determined the atomic weight of 55 of the 92 known elements, in many cases in parts per ten thousand, in some, parts per hundred thousand. All of the elements whose atomic weights were the basis for determining the atomic weights of other elements were determined. His work on lead from uranium and from non-radioactive sources advanced acceptance of the theory of isotopes, the only conclusive evidence until the development of the mass spectrograph.

He was always respectful to those on whose shoulders he was standing, J.J. Berzelius and J.S. Stas, pioneers in atomic weight determination, but when his superior methods showed that the Stas values had to be revised, he took the mantle on his own shoulders. A modest man, only after searching diligently for his own possible errors would he conclude that the Stas work had to be superseded.

He was guided to success by "his ability to foresee all sources of error and possible calamities which the average investigator would have overlooked completely," reported his son-in-law, James B. Conant.

Richards put it thus, "Every substance must be assumed to be impure, every reaction must be assumed to be incomplete, every method of measurement must be assumed to contain some constant error, until proof to the contrary can be obtained. As little as possible must be taken for granted."

It is illuminating to consider that much of his work was conducted in Boylston Hall, where his laboratory had been a stockroom, where the iron sashes of the fume hood rained rust, and a flood on the floor above caused the ceiling to collapse on him; where fumes from elsewhere in the building could ruin his experiments. Finally, the Wolcott Gibbs

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Carolyn R. Bertozzi to Receive 2019 Esselen Award

Carolyn R. Bertozzi, Ph.D., Anne T. and Robert M. Bass Professor of Chemistry and Professor of Chemical and Systems Biology and Radiology, Stanford University; Howard Hughes Medical Institute Investigator; Baker Family co-Director of ChEM-H is being presented with the Gustavus John Esselen Award for Chemistry in the Public Interest for her work in the advancement of bioorthogonal chemistry. In one application, Dr. Bertozzi studies the interaction of glycans on cell surfaces and has developed imaging tools that allow researchers to attach probes to specific

sugars and to discern the differences between the cell surfaces of healthy and cancerous cells. Dr. Bertozzi focuses on bringing her research closer to clinical practice and many of her current projects are aimed at solving specific clinical problems in the areas of cancer, inflammation and bacterial infection.

The Gustavus John Esselen Award for Chemistry in the Public Interest honors outstanding scientific achievement in scientific and technical work which contributes to the public well-being and has thereby communicated the positive values of the chemical profession. The award is presented annually by the Northeastern Section of the American Chemical Society and has honored such publicly renowned chemists as Robert Langer (polymers for medical applications), Kary Mullis (polymerase chain reaction) and Chad Mirkin (nanostructures in chemistry, biology and medicine). The Esselen Award is given to honor the memory of G. J. Esselen, past chair of the Northeastern Section and founder of Esselen Research Corporation.

In recognition of her contributions, Dr. Bertozzi will receive the Gustavus

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Monthly Meeting

The 986th Meeting of the Northeastern Section of the American Chemical Society

2018 Richards Medal Award Meeting

Thursday, March 14, 2019

Harvard University - Loeb House

17 Quincy Street, Cambridge, MA 02138

5:30 pm Reception (Loeb House)
17 Quincy Street

6:30 pm Dinner (Loeb House)

8:15 pm **Richards Medal Award Ceremony**
Mallinckrodt Building, Pfizer Lecture Hall - MB23,
12 Oxford Street, Cambridge, MA.

Andrew Scholte, NESACS Chair, Presiding

Reflections on Theodore William Richards

Introduction of the 42nd Richards Medalist

2018 Richards Medalist

Professor Chad A. Mirkin, Director of the International Institute for Nanotechnology and the George B. Rathmann Professor of Chemistry, Chemical and Biological, Materials Science & Engineering and Medicine, Northwestern University.

Title: *Rational Vaccinology: In Pursuit of the Perfect Vaccine*

**YOU MUST REGISTER IN ADVANCE TO ATTEND THE MEETING:
DINNER RESERVATIONS ARE REQUIRED.
THE PUBLIC IS INVITED**

- For those who would like to join us for dinner, register by noon, Thursday, March 7, using Eventbrite.
- To register, please use the link at: <http://www.nesacs.eventbrite.com/>
- Cost: Members, \$30; Non-members, \$35; Retirees, \$20; Students, \$10. Dinner reservations not cancelled at least 24 hours in advance will not be refunded.
- New members or those seeking additional information, contact the NESACS administrative coordinator, Anna Singer, at secretary@nesacs.org

Parking: Free parking in the Broadway St. Garage (3rd level or higher), enter from Cambridge Street via Felton, St. ◇

Carolyn R. Bertozzi

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John Esselen Award for Chemistry in the Public Interest on Thursday, April 11, 2019, in a ceremony at Harvard University's Mallinckrodt Chemistry Laboratories at 8pm. Free and open to the

public, Dr. Bertozzi's award lecture, to follow the presentation, is entitled "Chemical Approaches to Problems in Global Health."

Further information concerning the award can be found at the Northeastern Section's website, www.nesacs.org. ◇

Biography:

Dr. Chad A. Mirkin is the Director of the International Institute for Nanotechnology and the George B. Rathmann Prof. of Chemistry, Chemical and Biological Engineering, Biomedical Engineering, Materials Science & Engineering, and Medicine at Northwestern University. He is a chemist and a world-renowned nanoscience expert, who is known for his discovery and development of spherical nucleic acids (SNAs) and SNA-based biodetection and therapeutic schemes, Dip-Pen Nanolithography (DPN) and related cantilever-free nanopatterning methodologies, On-Wire Lithography (OWL), and Co-Axial Lithography (COAL), and contributions to supramolecular chemistry and nanoparticle synthesis.

He is the author of over 730 manuscripts and over 1,100 patent applications worldwide (over 300 issued), and the founder of multiple companies, including AuraSense, Exicure, TERA-print, and CDJ Technologies.

Mirkin has been recognized with over 130 national and international awards, including the Wilhelm Exner

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Abstract:

Rational Vaccinology: In Pursuit of the Perfect Vaccine

Spherical Nucleic Acids (SNAs) are an emergent therapeutic architecture, which consist of oligonucleotides radially conjugated to a nanoparticle core. This arrangement of DNA or RNA gives rise to unique properties not observed with their linear counterparts, such as rapid cellular uptake and increased resistance to nuclease degradation. The emergent properties of SNAs are revolutionizing the way we study, track, and treat disease and may help realize the promise of rational vaccinology: elucidating and leveraging the structure-activity relationships of SNAs to arrive at the most potent immunostimulatory construct. We are advancing this vision forward by treating solid tumors with

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Volunteering with the United States Pharmacopeia

By Chris Moreton, FinnBrit Consulting

The *United States Pharmacopeia (USP)* is one of three sets of official standards recognized under the US Food Drug and Cosmetic Act; the other two are the *National Formulary (NF)* and the Homeopathic Pharmacopeia of the United States. The *USP* is published by the United States Pharmacopeial Convention, Inc. (also called USP), headquartered in Rockville, MD. The current CEO of USP is Dr. Ron Piervincenzi. USP has a permanent staff and laboratories at its headquarters in Rockville, MD and satellite laboratories in China, India and Brazil. It also has further satellite office in Switzerland, Brazil and Ghana and it recently expanded its presence to Ethiopia, Indonesia, Nigeria and the Philippines. USP's work is supported by a network of Expert Committees and Expert Panels staffed by volunteer experts. I have been a volunteer with USP since the year 2000.

The *USP* was first published in 1820. This makes it one of the oldest of the modern pharmacopeias. Originally, it was revised every 10 years. The first Committee of Revision was established in 1830. Later, it was revised every five years, and the USP continues to operate on a five-year Revision Cycle. However, the book is now revised and re-issued annually with two supplements per year. This change in the revision schedules reflects the increasing number, range and complexity of pharmaceutical products, the ever-increasing sophistication of drug substances, and the need for better specifications and control methods for modern medicines.

In 1975, the administration of the *NF* was taken over by USP. Officially, the *USP* and the *NF* are two separate books. However, they are now published together in the same set of volumes and the title is now the *United States Pharmacopeia-National Formulary (USP-NF)*. There is also one further set of standards published by USP: The *Food Chemicals Codex (FCC)*. This does not have the official recogni-

tion in US law that the *USP-NF* has, but it is nevertheless a well-recognized set of standards for food ingredients.

The *USP-NF* 5-year Revision Cycle coincides with quinquennial USP Convention meeting. The next meeting will be in May 2020. There are more than 300 official delegates to the USP Convention including representatives from state medical boards, pharmacy boards, nursing boards, and dental boards, trade organizations and government departments. At this meeting, the members of the Board of Trustees (USP's governing body) and the chairs of the Expert Committees will be elected for the 2020–2025 revision cycle. The chairs of the different Expert Committees comprise the members of the Council of Experts. The Chair of the Council of Experts is USP's Chief Scientific Officer, Dr. Jaap Venema.

Following the election of the chairs of the Expert Committees, the new chairs, together with USP staff, will select the other members of the Expert Committees who will serve for the duration of the revision cycle. In addition, during the course of the revision cycle, Expert Panels will also very likely be set up. These panels are typically set up to address a specific issue where extra expertise in a particular field, beyond that of the members of the expert committee is required. All in all, USP is looking for several thousand potential volunteers, from both academia and industry. Not all volunteers will get elected to an Expert Committee, but there will then be further opportunities as Expert Panels are formed. The independent experts selected for the Expert Panels will typically come from those people whose names are on the list of volunteers.

As I mentioned, I have been a *USP-NF* volunteer since 2000. During my time as a volunteer, I have been involved in the development of new monographs, revision of existing monographs, development of new general chapters, revision of existing general

chapters, and preparation of *Stimuli* articles. I have also given presentations on behalf of *USP-NF* in the US at different conferences, and also in Brazil and China. I enjoy the work with *USP-NF* very much. I have met some very good friends through my *USP-NF* volunteer work. I find the work interesting and stimulating; it is a pleasant interlude to my day job. I also find it very satisfying to be able to contribute to improving the lives of people in the US and around the world.

The *USP-NF* is looking for a wide variety of scientific expertise and skills, and not just experts based in the United States. In the current Expert Committees, we have members from Europe, Asia and South America. The skills USP is looking for include (in no particular order):

- Analytical methods
- Small molecule drugs
- Proteins and biotechnology drugs
- Product development
- Formulation science
- Regulatory science
- Microbiology
- Pharmaceutical materials science
- Pharmacology
- Safety/toxicology
- Pharmaceutical packaging technology
- Statistics
- Dietary supplements
- Food ingredients
- Pharmaceutical compounding

The list of areas for the Expert Committees in the 2020 – 2025 Revision Cycle include:

- Excipients
- Reference Materials
- Statistics
- Compounding
- Food Ingredients
- Dietary Supplements and Herbal Medicines
- Biological Medicines

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Volunteering with Pharmacopeia

Continued from page 6

- Health Information and Technology
- Nomenclature and Labeling
- Healthcare Safety and Quality
- Microbiology
- Packaging and Distribution
- Physical Analytical Methods
- Dosage Forms
- Measurement and Data Quality
- Chemical Analytical Methods
- Chemical Medicines

[Please note, there may be more than one Expert Committee in a particular area.]

So, what are the commitments of being a USP-NF volunteer? Typically, volunteers spend two to four hours per week on official USP business outside of any travel to meetings. As a member of a USP-NF Expert Committee, you will be invited to attend face-to-face meetings in Rockville once or twice per year. These typically are two-day meetings and USP will pay all travel and accommodation expenses, but it does mean time away from the office. Attendance is not compulsory, but you will be asked to make every effort to attend. These face-to-face meetings are very valuable for resolving any differences, and they are also great networking opportunities. There is typically a monthly conference call lasting from one to two hours as well. In addition, there are e-mail inquiries and documents to read ahead to prepare for conference calls and meetings. Necessarily, these calls will take place during the normal working day. For these reasons, if you are interested in becoming a volunteer, you should get permission from your employer. There are some other aspects of being a USP-NF volunteer you should be aware of. First and foremost, if selected for an Expert Committee, you are there as an independent scientist. You are not representing your company or institution, or any other organization with which you may be associated. The USP-NF has a strict conflict of interest policy. It is recognized that volunteers will have conflicts of interest from time

to time, but as long as these are properly declared, they can be managed. You will also be expected to take part in all aspects of the work of your Expert Committee; this includes participation in the monthly conference calls, attendance at the face-to-face meetings and participation in e-mail discussions. All the proceedings of USP-NF committees are confidential and you will be required to sign a confidentiality agreement.

Expert Panels work somewhat differently. However, if selected you would still be required to declare any potential conflicts of interest and abide by the confidentiality rules. Expert Panels are typically set up for a shorter term (one to two years). Similar commitments in

terms of time are likely. A face-to-face meeting may be arranged, but it is not certain.

It is recognized that there will be scheduling conflicts from time to time – we all have day jobs; however, if you are considered not to be pulling your weight, you will be contacted and asked if you want to continue. Occasionally, an Expert Committee volunteer finds that they cannot continue to take a full part in the Committee's work. If this happens, for whatever reason, you are allowed to resign from your committee. A replacement will be found from the USP-NF's list of volunteers.

To volunteer for the USP-NF 2020–2025 Revision Cycle is quite easy.

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STEM JOURNEY VI: THE INTERNATIONAL SPACE STATION AND BEYOND

MARCH 2, 2019 AT SANDWICH HIGH SCHOOL

LEARNING BY (AND) STOKER PHOTO/3D SCULPTOR

6TH ANNUAL STEM JOURNEY

The International Space Station and Beyond

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Area colleges & universities showcase their STEM programs

Student club led activities/displays

STEM Journey is organized by the Cape & Islands Council of the Boy Scout of America, the Northeastern Section of the American Chemical Society, PID Analyzers, LLC and Sandwich STEM Academy

Recipients of the Theodore William Richards Medal for Conspicuous Achievement in Chemistry

1932	Theodore William Richards (Posthumously)	1960	Robert Sanderson Mulliken	1990	Rudolph A. Marcus
1932	Arthur Amos Noyes	1962	Saul Winstein	1992	John F. Waugh
1934	Gregory Paul Baxter	1964	Lars Onsager	1994	Richard H. Holm
1936	Charles August Kraus	1966	Paul Doughty Bartlett	1996	JoAnne Stubbe
1938	Gilbert Newton Lewis	1968	George Bogdan Kistiakowsky	1998	K. Barry Sharpless
1940	Claude Silbert Hudson	1970	William vonEggers Doering	2000	Mostafa A. El-Sayed
1942	Frederick George Keyes	1972	William Howard Stein	2002	Stephen J. Lippard
1946	Roger Adams	1972	Stanford Moore	2004	John Ross
1947	Linus Pauling	1974	Henry Eyring	2006	Richard R. Schrock
1948	Edwin Joseph Cohn	1976	Frank H. Westheimer	2008	Robert G. Bergman
1950	John Gamble Kirkwood	1978	Edgar Bright Wilson	2010	Richard N. Zare
1952	Morris Selig Kharasch	1980	Henry Taube	2012	Tobin Jay Marks
1954	George Scatchard	1982	John D. Roberts	2014	Harry B. Gray
1956	Melvin Calvin	1984	Ronald C. D. Breslow	2016	Gabor A. Somorjai
1958	Robert Burns Woodward	1986	F. Albert Cotton	2018	Chad Mirkin ◇

Theodore Richards

Continued from page 2

Memorial Laboratory, a gift of Dr. Morris Loeb, was built in 1912 and Richards had the facilities his work deserved.

The concentration on atomic weights suggests that Richards was solely an analytical chemist. Indeed, he was a superb analytical experimentalist, but his work in other areas of physical chemistry formed an important part of the total picture. His work began at the period when physical chemistry was aborning; van't Hoff, Arrhenius, Ostwald, Nernst were the new names and the *Zeitschrift für Physikalische Chemie* was founded in 1887. Richards' first student in physical chemistry was G.N. Lewis, to whom he assigned the study of the electrochemistry and thermochemistry of amalgam cells. Richards rejected the belief of that day that atoms were incompressible, developed evidence that atomic volumes change, and, according to Lewis, very nearly discovered the third law of thermodynamics in his studies of the relationship of changes in free energy and total energy accompanying a reaction.

His invention (with G.S. Forbes

and L.J. Henderson) of an adiabatic calorimeter led to studies of specific heats of acids, bases and salts, heats of solution and dilution, heats of neutralization and the thermochemistry of organic compounds.

His laboratory attracted students from many other countries to learn the methods of the Harvard school. His ability to devise methods which could give superb results in the hands of students led to volumes of published research. The list of his students includes many of the most capable physical chemists of the first half of the twentieth century.

At his death in 1928 the Northeastern Section appealed for funds to set up a memorial and, with 'gratifying response', raised a sum of ten thousand dollars in a few months. The Theodore William Richards Gold Medal was designed by Cyrus Dallin, a distinguished sculptor and friend of Richards.

A more complete account of the career of Richards may be found in a lecture delivered by Sir Harold Hartley and recorded in the *Journal of the Chemical Society (London)*, 1930, 1930-1968, from which much of this article was taken. Other sources include the *Encyclopedia Britannica* and *The NU-*

CLEUS. The Scientific Work of Theodore William Richards is the title of a Ph.D. dissertation by Sheldon J. Kopperl, U. Wisconsin, Madison, 1970, 333-359. ◇

CAREER DEVELOPMENT

Being an active participant in NESACS activities will enable you to network with major institutions and corporations in our area and can open up new career opportunities.

The NESACS Board of Publications, which is responsible for both the *Nucleus* newsletter and the NESACS website, is looking to increase its activities in this arena.

We would like to expand our capabilities for keeping our membership informed on what is happening in our field and how to adapt to changing times and new technologies.

You can help us do that. All we ask of you is a few hours a month and a smile.

Call or email to see what opportunities are available.

contact – Michael Filosa
NESACS Board of Publications
Phone - 508-843-9070

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Call for Entries

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Entries Due: **March 1, 2019**

Finals: April 5-6, Museum of Science, Boston

Learn more: www.mos.org/quantum-matters-competition



Sponsored by the Museum of Science, Boston with funding from the National Science Foundation (# 1231319)



Museum of Science.





Northeastern University Department of Chemical Engineering Presents:

From Atmospheric Complexes to Aerosols: New Insights into Atmospheric Chemistry

Friday, March 29th, 2019

Richards Hall Room 236 | Lecture - 11:45 am – 12:45 pm | Reception - 1:00 pm

Introduction by Professor Hicham Fenniri, Chemical Engineering



PROFESSOR JOSEPH S. FRANCISCO

The chemistry in our atmosphere governs phenomena such as ozone depletion, acid rain, and climate change. Having a firm understanding of all chemical processes at the molecular level in the atmosphere will allow for the development of accurate global climate models. This talk will discuss some of the more traditional chemical reactions that occur in the atmosphere, and how water influences both the mechanism and kinetic of atmospheric reactions. How gas-phase materials become incorporated with cloud droplets has been an intriguing subject for decades, and considerable work has been done to understand the interactions between closed-shell molecules and liquid water. The interactions between radical species and the air/water interface of cloud droplets, however, are not well understood. Fundamental structure and interactions of radical-molecules are critical to understanding binding, the configuration, and orientation of radicals the interface. This has important ramifications for our understanding of radical chemistry and lends new insight into the role that clouds and aerosols play in processing chemistry in the atmosphere.

Dr. Joseph S. Francisco completed his undergraduate degree in chemistry at UT Austin and his Ph.D. in Chemical Physics at MIT. After a fellowship at the University of Cambridge (UK), he returned to MIT as a Provost Postdoctoral Fellow. Dr. Francisco is currently the President's Distinguished Professor of Earth & Environmental Sciences and professor of Chemistry at the University of Pennsylvania. His work appeared in over 600 peer-reviewed publications.

Dr. Francisco received numerous awards, fellowships and recognitions throughout his career, including NSF's Presidential Young Investigator Award, the Sloan Fellowship, the Dreyfus Teacher-Scholar Award, the Guggenheim Fellowship, the Percy L. Julian Award for Pure and Applied Research, the ACS Morley Medal (Cleveland section), and the Alexander von Humboldt Award for U.S. Senior Scientists. Dr. Francisco is an ACS, APS, and AAAS Fellow. He is also a Fellow of the American Academy of Arts and Sciences and a member of the National Academy of Sciences. Dr. Francisco was honored on the floor of the 113th U.S. House of Representatives and received honorary degrees (Honoris Causa) from several universities.

Dr. Francisco served as President of the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (2005-2007). He also served as President of the American Chemical Society (2010) and as a member of its Board of Directors (2009-2011). President Barack Obama appointed Dr. Francisco as a member of the President's Committee on the National Medal of Science (2010-2015).

Hosted by:



Northeastern University
Department of Chemical Engineering



Invite for the CCEW event at the MoS, Boston: Saturday April 13, 2019

Dear All:

The NESACS and MoS will be celebrating Chemists Celebrate Earth Week at the Blue Wing of MoS on Saturday April 13, 2019 from 11.00 am - 3.00 pm. The event starts at 9.00 am with a training session.

The theme for Chemists Celebrate Earth Week event this year is Paper, "*Take Note: The Chemistry of Paper*". We encourage teams to bring their own activities related to the current theme. If you don't have one, please mention it on the sign-up sheet. We can provide you with activities. Looking forward to having science at the fun-filled STEM outreach event. After this event, the science educators can enjoy the Cambridge Science Festival happening in the same area.

Here is the schedule:

Arrival/Training: 9:00 – 10:30am

1st shift activities: 10:30am – 1:00pm (includes set-up time)

2nd shift activities: 12:30pm – 3:30pm (includes clean-up time)

Please complete the online form by Feb 15, 2019 (Friday). This would greatly assist the organizers with ordering t-shirts for our science educators (volunteers).

SIGN UP GOOGLE FORM: <https://goo.gl/forms/9gDDJIrynonR1JfO2>



Please enter the Name of your Institution, Title of your activity, Name & e-mail of the contact person from your Institute, names of all the science educators from your Institute, number of t-shirts (+ t-shirt sizes) for your team members at the above link.

We request the team leader from your institution to e-mail the organizers (Jay: jranga@salemstate.edu, David: dsittenfeld@mos.org & Emily: ehostetler@mos.org) the following information by March 1, 2019 (Friday).

- (a) Title of your activity
- (b) Abstract
- (c) List of chemicals to be used for the planned activity

We hope to have as many activities as possible at the Earth Day Event. All the science educators will receive an Earth Day t-shirt. As always, thanks for your commitment and enthusiasm.

Dr. Ranga

On behalf of Salem State University, NESACS, and MoS ◇

January 2019 Monthly Meeting

Photos by Brian D'Amico.



(l-r) Andrew Scholte (NESACS Chair), Mindy Levine (NESACS Past-Chair), Bonnie Charpentier (ACS President).



(l-r) Dorothy Phillips (ACS Director-at-Large), Michael Filosa (Nucleus Editor), Bonnie Charpentier (ACS President).



(l-r) Bonnie Charpentier (ACS President), Andrew Scholte (NESACS Chair), Christopher Thiele (Alnylam Pharmaceuticals), Anna Sromek (NESACS Chair-Elect).



Bonnie Charpentier (ACS President) having a conversation about "The ACS Community and Priorities for 2019."



Bonnie Charpentier (ACS President) during the Q&A session.



At the NESACS Younger Chemists and Women Chemists Committees Luncheon in Honor of ACS President Bonnie Charpentier.

continued on page 13

Volunteering With Pharmacopeia

Continued from page 7

Go to the USP website (www.usp.org). Place your cursor over 'About', and click on Volunteer Experts. Click on 'Become a Volunteer Expert' and then click on 'Apply Now'. Alternatively, contact me at a NESACS Meeting and ask me for a card with the QR code to take you straight to the site and page. Once at the page you will be asked to provide a summary of your expertise

and to select which type of Expert Committee(s) you wish to apply for (you are allowed to apply for more than one type or field).

One final point, to reiterate, not everyone who volunteers will be selected for an Expert Committee on the first round. Do not be disheartened, there will very likely be other opportunities as Expert Panels are set up, existing members step down, etc. The pharmaceutical and nutraceutical worlds are very dynamic; things are changing almost every day and the *USP-NF* and *FCC* have to

change accordingly. This will create opportunities for yet more people to become involved. ◇

Q. Exactly, how many awards and scholarships does NESACS sponsor?

A) One b) Two c) Many

www.nesacs.org/awards

January 2019 Monthly Meeting

Continued from page 12



Andrew Scholte (NESACS Chair), at left, presents Mindy Levine (NESACS Past-Chair) with her Past-Chair pin from the ACS.



Doris Lewis (Chair, NESACS Government Relations Committee) discusses chemistry and science education advocacy programs at the state and local levels with attendees of the meeting.

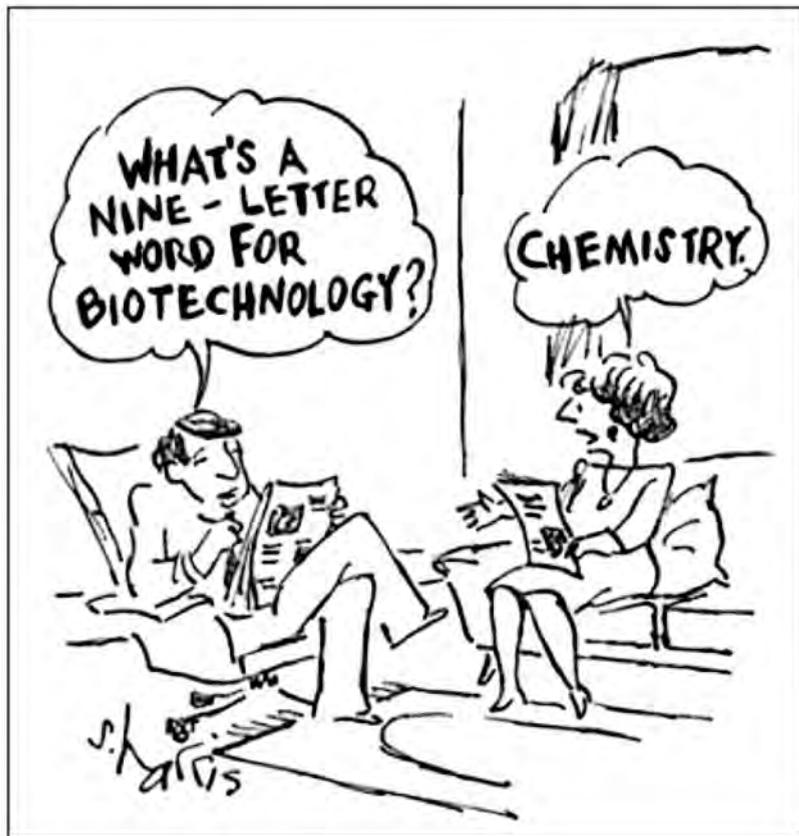


(l-r) Mindy Levine (NESACS Past-Chair), Andrew Scholte (NESACS Chair), Dajit Matharu (NESACS Alternate Councilor), Lee Latimer (ACS Director-at-Large), Michael Singer (NESACS Secretary).



(l-r) Tom Gilbert (NESACS Councilor), Jackie O'Neil (Alkermes), Jens Breffke (Boston Electronics), Zemen Berhe (NSYCC Career Chair).

A Cartoon by Sidney Harris



There is a healthy debate among scientists about which discipline can provide the best tools for solving key societal problems. This cartoon pokes fun at the sometimes—contentious relationship between chemists and biologists. Chemists are often the inventors and early developers of materials and techniques that drive biotechnology. Is this area (arguably biology's most useful side) then really just chemistry in disguise? Can chemists lay claim to the most impactful discoveries within it? Whether you'd argue yes or no to these questions, it could be the biology community that gets the last laugh. Another clue in the man's crossword puzzle: "A biologist who has made seminal discoveries in his or her field, perhaps (4 words)."

The answer: N-O-B-E-L-L-A-U-R-E-A-T-E-I-N-C-H-E-M-I-S-T-R-Y.

— Chad Mirkin, Northwestern

Win your own Sidney Harris original cartoon!

A contest will be held in which ACS members only can submit "one original cartoon caption" of 35 words or less. Cartoonist Sidney Harris will draw a cartoon based on the winning caption. The grand prize winner will receive the original cartoon based on the winning

caption. The runner-up will receive a personally autographed copy of one of Harris's most famous cartoons chosen by Harris. Deadline is April 1, 2019.

For more information and the official entry form, go to: <http://acshist.scs.illinois.edu/index.php> ◇

Biography

Continued from page 5

Medal, the RUSNANOPRIZE, the Dan David Prize, and the inaugural Sackler Prize in Convergence Research. He was an eight-year Member of the President's Council of Advisors on Science & Technology (Obama Administration), and one of very few scientists to be elected to all three US National Academies. He is also a Fellow of the American Academy of Arts and Sciences, the American Chemical Society, and the National Academy of Inventors, among others.

Mirkin has served on the Editorial Advisory Boards of over 20 scholarly journals, including *JACS*, *Angew. Chem.*, and *Adv. Mater.*; at present, he is an Associate Editor of *JACS*. He is the founding editor of the journal *Small*, and he has co-edited multiple bestselling books.

Mirkin holds a B.S. degree from Dickinson College (1986) and a Ph.D. degree from the Penn. State Univ. (1989). He was an NSF Postdoctoral Fellow at the Massachusetts Institute of Technology prior to becoming a professor at Northwestern University in 1991.

◇

Abstract

Continued from page 5

immunostimulatory SNAs that activate an immune response against cancer cells. This presentation will describe these advancements and illustrate how rational vaccinology may improve human lives. ◇

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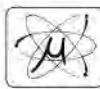
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Calendar

Check the NESACS home page
for late Calendar additions:
<http://www.NESACS.org>

Note also the Chemistry Department web
pages for travel directions and updates.
These include:

<http://www.bc.edu/schools/cas/chemistry/seminars.html>
<http://www.bu.edu/chemistry/seminars/>
<http://www.brandeis.edu/departments/chemistry/events/index.html>
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<http://www.unh.edu/chemistry/events>
<https://www.wpi.edu/academics/departments/chemistry-biochemistry>

**Looking for seminars
in the Boston area?**

Check out the
NESACS Calendar
www.nesacs.org/seminars

March 1

Prof. Mircea Dinca (MIT)
UMass-Lowell, Olney 316, 3:30 pm

March 4

Prof. Hosea Nelson (UCLA)
Boston University, Metcalf 113, 4:00 pm

Prof. Scott Auerbach (UMass Amherst)
Brandeis, Gerstenzang 124, 3:40 pm

Prof. Jeffrey Rinehart (UCal-San Diego)
Harvard, Pfizer Lecture Hall, 4:15 pm

Prof. Douglas C. Rees (Cal Tech)
*The nitrogenase mechanism: peering inside the
black box*
MIT, 4:00 pm

March 5

Prof. Emily Weiss (Northeastern)
Quantum dots: Photophysics to Photochemistry
MIT, Rm 6-120, 4:00 pm

Dr. Bruce Kay (Pacific Northwest Nat. Lab)
Tufts, Pearson P-106, 4:30 pm

Prof. Regina Frey (Washington Univ.-St. Louis)
Univ. New Hampshire, Parsons N104, 11:10 am

March 6

Prof. Dan Tawfik (Weizmann Institute of
Science)
Boston University, Metcalf 512, 2:00 pm

Prof. Amy Rosenzweig (Northeastern)
MIT, Rm 4-370, 4:15 pm

March 11

Sergei Tretiak (Los Alamos Nat. Lab)
Brandeis, Gerstenzang 124, 3:40 pm

Prof. Francesco Paesani (UCal-San Diego)
Harvard, Pfizer lecture hall, 4:15 pm

Lynn Abell (Agiros Pharmaceuticals)
MIT, 4:00 pm

March 12

Dr. James Skinner (Univ. Chicago)
*Anomalies in ambient and supercold water: is
there a second critical point lurking nearby?*
MIT, Rm 6-120, 4:00 pm

Prof. Michelle Arkin (UCal-San Francisco)
Tufts, Pearson P-106, 4:30 pm

March 13

Dr. James Skinner (Univ. Chicago)
*Vibrational spectroscopy in water around phase
diagram: clusters, liquid, interfaces and
crystalline and amorphous ices*
MIT, Rm 6-120, 4:00 pm

Prof. Michael Nippe (Texas A&M)
MIT, Rm 4-370, 4:15 pm

March 14

Prof. Wei Xiong (UCal-San Diego)
Boston College, Merkert 130, 4:00 pm

Prof. Ohyun Kwon (UCLA)
MIT, Rm 6-120, 4:00 pm

March 18

Prof. Adrian Roitberg (Univ. Florida)
BU, Metcalf 113, 4:00 pm

Prof. Darrel Irvine (MIT)
Brandeis, Gerstenzang 124, 3:40 pm

March 19

Prof. Ron Raines (MIT)
Harvard, Pfizer Lecture Hall, 12:45 pm

Dr. Wesley P. Wong (Harvard)
*Probing single-molecule interactions with
parallel force spectroscopy*
MIT, Rm 6-120, 4:00 pm

Prof. Eva Rose M. Balog (Univ. New England)
U. New Hampshire, Parsons N104, 11:10 am

March 20

Prof. Mike Harms (Univ. Oregon)
Boston University, Metcalf 512, 2:00 pm

Prof. Colin Nuckolls (Columbia)
MIT, 4-370, 4:15 pm

March 21

Prof. De-en Jiang (UCal-Riverside)
Boston College, Merkert 130, 4:00 pm

March 25

Prof. Yi Tang (UCLA)
Boston University, Metcalf 113, 4:00 pm

Prof. Jack Szostak (Harvard)
Harvard, Pfizer Lecture Hall, 4:15 pm

March 26

Prof. Cherie Kagan (Univ. Pennsylvania)
Tufts, Pearson P-106, 4:30 pm

Prof. Rachel Stanley (Wellesley College)
Univ. New Hampshire, Parsons N104, 11:10 am

March 27

Prof. Kamil Godula (UCal-San Diego)
Boston College, Merkert 130, 4:00 pm
Prof. Huan-Xiang Zhou (U. Illinois-Chicago)
Boston University, Metcalf 512, 2:00 pm

March 28

Prof. Mark S. Taylor (Univ. Toronto)
MIT, 6-120, 4:00 pm

March 29

Prof. X. Peter Zhang (BU)
*Metalloradical catalysis for stereoselective
radical reactions*
UMass Lowell, Olney 316, 3:30 pm

**Notices for The Nucleus
Calendar of Seminars should
be sent to:**

Samurdhi Wijesundera, Email:
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