Monthly Meeting

A Medicinal Chemistry Symposium at Takeda Oncology

Special Regional Meeting

Sponsored by the Green Mountain Section of the ACS

June Meeting Report

W. E. Moerner Speaks at Nova Biomedical
By Jack Driscoll

Edwin Land NHCL Designation

by Vivian Walworth
Northeastern University

Department of Chemistry and Chemical Biology

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http://www.northeastern.edu/cos/chemistry/

For more information, please contact: Cara Shockley – Graduate Administrator
c.slashley@neu.edu
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Cover: (L-R) Jerry Jasinski, NESACS Chair-Elect, Katherine Lee, NESACS Chair, Professor William E. Moerner, Stanford University, 2014 Nobel Laureate in Chemistry, Mukund Chorghade, THINQ Pharma, Jack Driscoll, NESACS Public Relations Chair (Photo by Jennifer Maclachlan)

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December 2015 Issue: October 15, 2015

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June 2015 Monthly Meeting

Professor W. E. Moerner-2014 Nobel Prize Winner in Chemistry Lectures at NESACS

By Jack Driscoll, NESACS Public Relations Chair

The information for this article was taken from an interview with Prof. Moerner on March 28, 2014, the Stanford University website, the website of the Thomas Jefferson High School Alumni Association, Internet articles, the Nobel Prize website and his visit to Waltham, Massachusetts for the NESACS Monthly Meeting on June 11, 2015.

Nobel Prize Background

Moerner was at a conference in Brazil when his wife called him last October. “I had this feeling of incredible excitement, and my heart was racing, because you don’t know if this is real or not,” he said. “You never expect such things, because there are lots of scientists doing exciting research all over the world. This prize is possible because of the incredible work by my group of students and postdocs over a long period of time.”

Moerner shared the $1.1-million Nobel Prize in chemistry with Eric Betzig of Howard Hughes Medical Institute in VA and Stefan W. Hell of the Max Planck Institute for Biophysical Chemistry in Germany “for the development of super-resolved fluorescence microscopy”. His research is praised for making it possible for researchers “to view the toxic protein accumulations in the brain cells of patients with deadly Alzheimer’s and Huntington’s diseases.” Because of his work, researchers “can also study how biomolecules—such as DNA and enzymes—work in cells to carry out the processes that are critical to life.”

Moerner and Betzig were recognized for work done separately to advance super-resolution microscopy with single molecules, while Hell was recognized for developing a technique that uses patterned laser beams to achieve similar high-resolution imaging results.

The research into super-resolution microscopy has enabled researchers to effectively image and resolve objects that are smaller than a wavelength of light. That size had previously been accepted as the limit of microscopy’s ability because optical microscopes by definition cannot resolve objects smaller than about half a micron. They would appear somewhat blurry. Although electron microscopy and X-ray technologies can surpass this level of detail, these techniques required scientists to kill the cell in order to make the observation.

To perform super-resolution microscopy, a researcher must first label the molecule of interest with a fluorescent molecule that is switchable (ability to turn the fluorescence on and off). While at UC-San Diego in the 90s, Moerner discovered just such an effect for a green fluorescent protein (GFP), which was sweeping the world at that time as a genetically encoded label in cells. Once the molecule of interest is labeled, reading light as well as control light are provided while capturing images of the cell. Not every GFP tag emits at the same time, so researchers can distinguish individual molecules labeled with GFP as spots of light, and these spots provide the key information about the locations of the molecules of interest.

While these spots appear much larger than the molecules themselves due to diffraction, an approximation of the spot’s center provides the location of the labeled molecule. To build a full image, simply superimpose all of the locations of centers onto one image. The uncertainty present in approximating the spot’s center is the uncertainty of the blurriness due to diffraction, resulting in a potential tenfold increase in resolution.

This image of a specialized brain cell was captured using a structured illumination super-resolution microscope — the kind of equipment made possible because of W.E. Moerner’s work. By keying in on fluorescent light, however, Moerner and his co-winners were suddenly able to see much smaller molecular structures. “With light, you can’t observe details smaller than half a micron,” he said. “But with the new continued on page 12

2014 NESACS Sponsors

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Meeting Hosts (2014)

Amgen
Astra Zeneca
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Monthly Meeting
The 953rd Meeting of the Northeastern Section of the American Chemical Society
Organized by the Medicinal Chemistry Group of the Northeastern Section
A Medicinal Chemistry Symposium Sponsored by Takeda Oncology
Controlling Protein Processes for New Drug Therapies
Thursday – September 10th, 2015
Takeda Oncology
40 Landsdowne St, Cambridge, MA 02139
3:00 pm Refreshments
3:15 pm Welcome, Raj (SB) Rajur, NESACS Medicinal Chemistry Program Chair, CreaGen Biosciences, Inc., Woburn, MA
3:20 pm Introductory Remarks (Moderator)
3:30 pm Professor Craig Crews, Yale University, Depts. of MCDB, Chemistry, Pharmacology, New Haven CT
*PROTACS: Induced Protein Degradation as a Therapeutic Strategy*
4:15 pm Weiwen Ying, Fellow and Vice President, Discovery Chemistry, Synta Pharmaceuticals, Lexington, MA
*Hsp90 Inhibitor Drug Conjugates (HDCs): A Novel Drug Delivery Platform*
5:00 pm TBA
6:00 pm Social Hour
6:45 pm Dinner
7:45 pm Keynote Presentation
*Introduction/Welcome: Takeda Oncology, Jeffrey Ciavarrie, Ph.D., Senior Scientist, Takeda Oncology, Cambridge MA*
*Discovery of MLN7243: An Investigational, First-in-Class Inhibitor of the Ubiquitin Activating Enzyme for the Treatment of Cancer*

YOU MUST REGISTER IN ADVANCE TO ATTEND THE SYMPOSIUM: THERE IS A $1 FEE TO ATTEND THE SYMPOSIUM; DINNER RESERVATIONS ARE REQUIRED.

THE PUBLIC IS INVITED
Dinner reservations should be made no later than noon, Thursday, September 3rd, 2015. Reservations are to be made using PayPal: http://www.acssymposium.com/medchem-paypal.html. Select pay with credit or debit card option and follow the additional instructions on the page. Members, $30; Non-members, $35; Retirees, $20; Students, $10. Reservations for new members and for additional information contact the Administrative Coordinator, Anna Singer (email preferred) at (781) 272-1966 between 9am and 6 pm or e-mail at secretary@nesacs.org. Reservations not cancelled at least 24 hours in advance must be paid.

### Speaker Biography

**Craig Crews**

Craig Crews is the Lewis B. Cullman Professor of Molecular, Cellular and Developmental Biology and holds joint appointments in the departments of Chemistry and Pharmacology at Yale University. He graduated from the U.Virginia with a B.A. in Chemistry and received his Ph.D. from Harvard University in Biochemistry.

Dr. Crews has a foothold in both the academic and biotech arenas. He has been on the faculty at Yale since 1995 and his laboratory has pioneered the use of small molecules to control intracellular protein levels. In 2003 he co-founded Proteolix, Inc., whose proteasome inhibitor, Kyprolis™ recently received FDA approval for the treatment of multiple myeloma.

Since Proteolix’s purchase by Onyx Pharmaceuticals in 2009, Dr. Crews has focused on a new drug development technology, which served as the founding IP for his latest New Haven-based biotech venture, Arvinas, Inc.

Currently, Dr. Crews serves on several editorial boards and is Editor of *Chemistry&Biology*. In addition, he has received numerous awards and honors, including the 2013 CURE Entrepreneur of the Year Award, 2014 Ehrlich Award for Medicinal Chemistry and an NIH R35 Outstanding Investigator Award (2015).
CALL FOR APPLICATIONS

NSYCC/NESACS–JCF/GDCh
Exchange to Germany
March 12–20, 2016

The Younger Chemists Committee and the Education Committee of the Northeastern Section of the American Chemical Society (NESACS) invite applications from undergraduate and graduate students of chemistry, biochemistry, and chemical engineering (including materials science) at colleges and universities within the Northeastern Section who are currently engaged in original research to spend a week in Germany as the guests of the Jungchemikerforum (Young Chemists Committee; JCF) of the Gesellschaft Deutscher Chemiker (German Chemical Society; GDCh). The exchange group will consist of up to 12 students and a number of faculty and industrial representatives.

The trip to Germany will start with an overnight flight from Boston on Saturday, March 12; return to Boston will be on Sunday, March 20. The highlight of the visit will be the JCF student chemistry research conference (Frühjahressymposium) in Kiel on Wednesday–Saturday, March 16-19, which will provide the opportunity for the participants to engage in extensive networking with German and other European students, and to take part in discussions focused on research, careers, education, and international opportunities. The activities for the first part of the week will include excursions to industrial, academic, scientific, and cultural institutions in northern Germany. Each student representative from NESACS will be expected to make a poster or oral presentation on his/her research at the Frühjahressymposium, and upon return at the Northeast Student Chemistry Research Conference (NSCRC) in April. Air tickets will be provided by NESACS; accommodations in Germany will be covered by GDCh. A working knowledge of German, while useful, will not be specifically required; the language of the Frühjahressymposium and the other events will be English.

Application forms are available on the YCC <http://www.nsycc.org> and NESACS <http://www.nesacs.org> websites. The following material must be submitted electronically with the application form: 1) the abstract of the presentation to be made at the Frühjahressymposium and the NSCRC; 2) an essay on the relevance of the exchange to the student’s professional goals; 3) A letter of recommendation from your faculty research supervisor that supports your application. In addition it is to certify that you are currently engaged in research under her/his supervision, and that he/she gives you permission to be absent from the research laboratory for the period March 12-20, 2016; 4) approval from the supervisor and the chair of the department for the student’s absence from classes, the research laboratory, and other responsibilities. In addition, finalists will be interviewed by members of the German Exchange Steering Committee.

Prospective applicants who may be planning on attending the Spring ACS national meeting in San Diego should note that it will take place on March 13-17, 2016 during the time of the Exchange. Applications are being accepted from students who are within the NESACS geographic area, which comprises all of New Hampshire and the following counties in eastern Massachusetts: Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk, Plymouth, and Suffolk.

For more information, contact Leland L. Johnson, Jr., Chair of the German Exchange Steering Committee, at <ljohnson@theconditasgroup.com>.

Deadline for electronic receipt of applications: Sunday, November 1, 2015, at 5:00 p.m. 

For late breaking news, job postings and the latest meeting and event information please visit us at WWW.NESACS.ORG

Call for Nominations

The Gustavus John Esselen Award for Chemistry in the Public Interest

The Northeastern Section of the American Chemical Society (NESACS) is inviting nominations for its prestigious Gustavus John Esselen Award for Chemistry in the Public Interest. This award is given annually to a chemical scientist, whose scientific and technical work has contributed to the public well-being and has thereby communicated the positive values of the chemical profession. The significance of this work should have become apparent within the five years preceding nomination. The awardee shall be a living resident of the United States or Canada at the time of the nomination.

There is no limitation to the field of chemistry. The selection committee focuses on the general public recognition of the work, as well as its scientific/technical significance.

The Award consists of a bronze medal and the sum of $5,000. Travel expenses incidental to the conferring of the award will be reimbursed. The award will be presented at the April 2016 meeting of the Section. The Awardee is expected to deliver an address on the subject of the work for which the honor is conferred, or for work in progress, which is also directed toward chemistry in the public interest.

Nominations should be submitted as a single pdf file including: 1) a letter signed by the primary sponsor with a description of the nominee’s work recognized as making a major contribution to the public welfare and as communicating positive values of the chemical profession, plus the names of two co-sponsors; 2) short supporting co-sponsor statements; 3) the nominee’s professional biography including a list of no more than ten of the nominee’s publications selected for their pertinence to the work nominated for recognition; and 4) copies of popular
NERACS Board Meeting

By Morton Z. Hoffman, NESACS Representative to the NERACS Board [hoffman@bu.edu]

The Board of Directors of the Northeast Region of the ACS, Inc. (NERACS) met on Saturday, June 13, 2015, at Ithaca College on the occasion of the Northeast Regional Meeting (NERM 2015). Serving on the NERACS Board are representatives of the constituent local sections in the Northeast Region (Binghamton, Central Massachusetts, Central New York, Connecticut Valley, Cornell, Corning, Eastern New York, Green Mountain, Maine, Mid-Hudson, New Haven, Northeastern, Northern New York, Penn-York, Rhode Island, Rochester, Western Connecticut, Western New York) and its officers (Chair: Richard Cobb, Rochester; Vice Chair: Willem Leenstra, Green Mountain; Secretary: Anthony Noce, Eastern New York; Treasurer: Wayne Jones, Binghamton).

Also in attendance at the meeting were Tom Gilbert (ACS District I Director), Dorothy Phillips (ACS Director-at-Large), and Brittany Vesce-Rubenc (ACS staff liaison to NERM).

The Board elected Anthony Noce as Chair and reelected Willem Leenstra as Vice Chair for two-year terms (2016-17). Alyssa Thomas-Kuelling (Central New York) was appointed by the Chair to serve out Tony Noce’s term as Secretary in 2016; the two-year term for the current Treasurer runs through next year. The Board also stated with applause its appreciation for the service Richard Cobb provided to NERACS as its Chair and Vice Chair over many years.

Inasmuch as the assets in the NERACS Treasury are now around $59,000, it is appropriate to start discussions about the long-term use of those funds. At the present time, any income above expenses for a NERM is shared in a 60/40 ratio between the hosting local section and NERACS; consideration will be given to a 70/30 split or some other ratio. A motion was made and voted to increase the seed loans to upcoming regional meetings from $4,000 to $5,000.

It was reported by Akiko Fillinger, General Chair of NERM 2015, that the number of registrants for the meeting was 665 (the budget was for 500), including 125 undergraduates and 250 graduate students. There were 416 presentations, including 172 posters. Sixteen vendors and 13 graduate schools were part of the exposition. Income for the meeting is projected to be more than $62,000 and expenses will be about $55,000; a surplus of as much as $10,000 is expected.

Richard Cobb expressed concern about the paucity of nominations for the regional awards that are presented at NERM; in fact, some awards cannot be given because the number of nominations does not reach the stipulated minima. He asked the representatives of the local sections to urge their officers and members to be active in the nomination process. The following Northeast Region awards will be presented at NERM 2016: Outstanding Achievements in the Chemical Sciences; Division of Chemical Education Award for Excellence in High School Teaching; E. Ann Nalley Award for Volunteer Service to the ACS; Stanley Israel Award for Advancing Diversity in the Chemical Sciences.

NERM 2016 will be held at the Binghamton University Downtown Center in Binghamton, NY, on Wednesday-Saturday, October 5-8; the meeting website is <http://nerm2016.sites.acs.org/>. Wayne Jones will be the General Chair for the hosting Binghamton Local Section.

The Eastern New York Local Section has proposed to host NERM 2017 in Saratoga Springs, NY, in the Spring of that year. At the present time, no NERM is scheduled for 2018. The Rochester Local Section has expressed interest to host the meeting in Fall 2019. The Green Mountain Local Section is considering holding a meeting in Burlington, VT, in Spring-Summer 2020. Inasmuch as the ACS Fall 2021 national meeting has been moved from Boston to Atlanta, the question was raised as to whether NESACS would be interested in hosting NERM that year, possibly in New Hampshire or on Cape Cod.

The ACS International Activities Committee (IAC) funded a proposal written by Richard Cobb to develop an analogue in the Atlantic area (“AtlantiChem”) of the centennial PacifiChem that would involve the Northeast, Middle Atlantic, and Southeast ACS regions. As the concept evolved, national ACS, the Canadian Society for Chemistry (CSC), and the Chemical Society of Mexico saw opportunities for an extension of AtlantiChem to a larger geographic area with possible involvement by the Brazilian Chemical Society and the Federation of African Societies of Chemistry with the meeting to be held in late 2017 or early 2018 and continuing on a five-year cycle.

It was noted that a discussion of the organization of AtlantiChem would be held in Ottawa the following day at the CSC 2015 conference. Representing NERACS will be Julie Smist (Connecticut Valley), former NERACS Chair; Morton Hoffman (Northeastern) will also attend as a member of IAC. The results of that meeting will be reported separately.

Tony Noce reported on the results of a NERACS strategic planning meeting that was held in Albany in November 2014. Four strategic goals of NERACS were identified:

1. Create a process whereby at least four future regional meetings are in the pipeline at all times, and establish administrative and financial incentives for local sections to consider hosting a NERM.
2. Maintain active representation of all the local sections within NERACS on the Board of Directors with possible financial assistance to defray the cost of attending the meeting.
3. Provide regional resources to support local section activities, for example, a regional speakers’ bureau.
4. Improve communications with sections and their members with an immediate focus on an updated, professional-looking website.

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National Historic Chemical Landmark Designation

By Vivian Walworth

NESACS is proud to celebrate the ACS designation of the historic building at the northeast corner of Main and Osborn Streets in Cambridge as a National Historic Chemical Landmark, the site of the office and laboratory of Dr. Edwin H. Land, founder of Polaroid Corporation and inventor of Instant Photography. Dr. Land’s contributions span a wide range, from the invention of sheet polarizers and their application to display of stereoscopic images to one-step photography, innovative imaging chemistry, and new insights into color perception. The celebration will take place at the nearby MIT Museum, which holds the major collection of Polaroid photographic images and materials, from the early experimental stages onward.

The building itself is recognized by the City of Cambridge as a landmark, the oldest intact industrial complex in the city. First constructed in the early 1800s as a brick store, the building was occupied by the Davenport Car Works in 1842. Soon afterward the company added six one-story workshops, and in 1848 added two 2-story brick wings behind the front building. Davenport pioneered the design and construction of railroad passenger cars with center aisles and reversible seats, also constructed freight cars and a few steam locomotives. A plaque on the Main Street face of the building commemorates the Davenport plant.

The next occupant was an iron foundry, Allen & Endicott, which rented out space to others, including J.J. Walworth & Co, manufacturer of plumbing and steam-heating equipment. On October 9, 1876. Alexander Graham Bell and his assistant, Thomas Watson, used the Walworth telegraph line between the Cambridge plant and the Walworth office in South Boston to make the first long-distance telephone call. The Telephone Pioneers of America later mounted a celebratory plaque on the Main Street face of the building.

In 1927 the Kaplan Furniture Company, maker of fine furniture, purchased the building. That company rented some of its space to the Polaroid Corporation during the early 1940s. Founder Edwin Land opened a laboratory there and also established a training school on the second floor to train military personnel to make Polaroid Vectograph stereoscopic images in the field. Polaroid provided field kits, and Vectograph images were used throughout WW2 in support of aerial reconnaissance.

Dr. Land conducted the first experiments in one-step photography in his Kaplan building laboratory, and he continued work in his office and laboratory there until his retirement from Polaroid in 1982. Polaroid had occupied the entire building by 1960, and facilities there included both black-and-white and color research labs, a projection room, and several additional research laboratories and darkrooms. Supporting research facilities, offices, workshops, engineering departments, and a research library occupied nearby buildings.

Polaroid purchased the Kaplan building in 1988 and sold it to MIT in 1998. In 2014 the Polaroid Retirees Association added a plaque commemorating Dr. Land’s achievements. That plaque was mounted beside the earlier plaques on the Main Street face of the building.

MIT has fully preserved the external façade of the building, renovated the interior, and constructed an 80,000 square foot addition. Completed in 2002, the project received a Preservation Award from the Cambridge Historical Commission in 2003. The building is now managed by MIT and occupied by modern Pfizer biotech research and development laboratories.

The NHCL plaque will commemorate Dr. Land’s highly productive research contributions, which included the introduction of instant photography, from sepias one-step photographic prints in 1947 to the fully automatic SX-70 camera and integral color film in 1972.

NESACS is hosting the Hospitality Booth at the ACS meeting in Boston!

We are asking NESACS members to help host our National ACS members by choosing a two hour time slot (you can choose more than one) available from Saturday, August 15th thru Thursday, August 20th.

The link for SignUp Genius is: www.SignUpGenius.com/go/10C044AAAAB2BA8-nesacs/5473074

our editor by calling and saying you appreciate the quality and content of our newsletter. Our editor works hard to maintain a publication of interest to our membership. Oh, and by the way you could also give credit to our advertisers who financially support us.
Special Regional Meeting

Meeting of the Green Mountain Section (GMS) of the American Chemical Society
Co-sponsored by:
The New Hampshire Area of the Northeastern Section of the American Chemical Society (NESACS)
The Central Massachusetts Section (CMS) of the American Chemical Society
The Connecticut Valley Section (CVS) of the American Chemical Society

Thursday, October 22, 2015
Porter Community Room
Montshire Museum
One Montshire Road, Norwich, VT 05055

Agenda:
5:00 PM Registration and light refreshments
6:00 PM Welcome:
  Richard Milius, Chair, GMS, Lecturer, Norwich University
  Neil Glagovich, Chair-Elect, CVS, Professor,
    Central Connecticut State University
  Meledath Govindan, Chair, CMS, Professor,
    Fitchburg State University
6:15 PM Introduction of the Collaborative Meeting of four Local Sections of the ACS
  Jerry P. Jasinski, Chair-Elect, NESACS, Professor,
    Keene State College
6:30 PM Seminar: Dr. Jimmy Wu, Associate Professor,
    Department of Chemistry, Dartmouth College
    Taking Aim at Type 2 Diabetes Mellitus: Identification of GLP-1 Secretagogues and the
    TRPA1 Receptor as Their Biological Target”
7:15 PM Closing remarks: David Heroux, Chair-Elect, GMLS, Associate Professor, St. Michael’s College
7:20 PM Reception

THE PUBLIC IS INVITED

• The registration fee is $15. Register through http://acssymposium.com/paypal-gms.html by Friday, October 15, 2015.
• Questions? Contact NESACS Administrative Coordinator Anna Singer at 781-272-1966 or secretary@nesacs.org (email is preferred).

Directions to Montshire Museum: http://www.montshire.org/visit/directions/
The Montshire Museum is conveniently located just off Interstate 91 at Exit 13 (look for the “Museum of Science” signs) in Norwich, VT, five miles north of White River Junction. The Museum is directly across the Connecticut River from Hanover, NH, home of Dartmouth College.
Special Thanks to the Montshire Museum for providing the venue for this event.

Biography

Jimmy Wu received his A.B. degree in Chemistry from Princeton University in 1998. He then spent two years as an associate chemist at Merck Process Research before moving to Harvard University in 2001. There, he obtained his Ph.D. in organic chemistry from Prof. David A. Evans in 2005. He continued his studies as a postdoctoral fellow with Prof. Barry M. Trost at Stanford University. He then joined the Department of Chemistry at Dartmouth College in the summer of 2007 and is now an associate professor. His research is focused on the synthesis of novel compositions of matter and complex natural products for the study of biological systems.

Abstract

Glucagon-like peptide-1 (GLP-1) is an incretin hormone that has been validated as a target for the treatment of type 2 diabetes mellitus (T2DM), a disease that affects nearly 350 million people worldwide with a global cost of over $600 billion dollars. When bound to its receptor on the β cells of the pancreas, GLP-1 promotes the secretion of insulin, thereby lowering blood glucose. It also slows gastric emptying and suppresses appetite, so is a potential drug for the treatment of morbid obesity. Its activity is highly dependent on the presence of glucose; therefore, T2DM therapeutics based on this pathway are less prone to causing hypoglycemia. Several GLP-1 mimetics have either gained regulatory approval or are in clinical trials (i.e.,

continued on page 14
The Northeastern Section celebrates Chemists Celebrate Earth Day

by Dr. Jayashree Ranga, Salem State University and David Sittenfeld, Museum of Science

Chemists Celebrate Earth Day event was organized at Blue Wing of Museum of Science, Boston, on Sunday, April 12, 2015 from 12 - 4 pm by the Northeastern Section of American Chemical Society and the Museum of Science. More than 70 energetic volunteers from various organizations supported the event. About 2000 visitors participated in a variety of CCED activities on that day. There were multiple activities geared towards Earth Day’s theme: “Climate Science – It’s More than a Weather Report”. Students from various organizations designed activities to cater to a variety of visitors at the Museum of Science. Activities presented at the event included green energy systems, ocean acidification, alternative energy, effects of carbon dioxide on the environment, melting glaciers and icebergs, self-inflating balloons, specific heat lab, and density of carbon dioxide.

The key goal of this event was to provide opportunities for young visitors with hands-on science activities. The volunteers did a fantastic job of engaging diverse group of visitors with demonstrations. Special thanks to volunteers from American Chemical Society, Fitchburg State University, Gordon College, Malden High School, Museum of Science, Northeastern University, Raytheon, Salem State University, Suffolk University, and U. Mass Boston.

Our Section also participated in the CCED-2015 Illustrated Poem contest. The winners were:

Abbey Keith, Grade K (K - 2nd Category) Hanover Girl Scouts, Teacher: Libby Corbo
Cassie Lopes, Grade 4 (3rd-5th Category) Hanover Girl Scouts, Teacher: Bryerton
Jillian Poirier (6th - 8th Category) Girl Scout Troop 80037, Teacher: Heavern

Thank you CCED volunteers!*

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University of Massachussets, Boston
Dr. Jonathan Rochford, William Butts, Amanda Carey, Tue Ngo, Jerry Gilligan

List of other volunteers
Cosmo V. Sabatino

*I apologize if your name is not on this list.

NESACS will be organizing National Chemistry Week in October. The 2015 theme for NCW is “Chemistry Colors Our World!” Exploring the chemistry of dyes, pigments, and light. ◇
Report from Ottawa: AtlantiChem

By Morton Z. Hoffman [hoffman@bu.edu]

A discussion was held on June 14, 2015, in Ottawa, Ontario, at the Canadian Chemistry Conference to explore the possibility of holding a meeting in late 2017 or early 2018 that would involve chemists in the area around the Atlantic Ocean ("AtlantiChem") analogous to the pentennial PacifiChem.

Representing the Canadian Society for Chemistry were Youla Tsantrizos, President; Neil Burford, Vice-President; Hugh Horton, Treasurer; Roland Andersson, Executive Director; and Directors Joan Kingston and Bernadette Dacey.

For the ACS, the attendees were Diane Grob Schmidt, President; Denise Creech, Director, Member and Scientific Advancement Division; Lori Brown, Office of International Activities; Steve Meyers, Office of Professional Development; Julie Smist, (Springfield College), former Chair of the Northeast ACS Region (NER-ACS); and Morton Hoffman (Boston University), NESACS representative to the NERACS Board of Directors and member of the International Activities Committee.

The Chemical Society of Mexico was represented by its President, Lena Ruiz Azuara.

AtlantiChem, which would take place every five years, would initially aim to attract about 1,000 attendees for presentations and discussions on targeted topics, such as STEM education, neuroscience, biotechnology, and nanotechnology. It would be scheduled in December 2017 or January 2018 so as not to conflict with other national and international conferences, and held in a warm and inviting location.

Support for AtlantiChem has also come from the Brazilian Chemical Society and the Federation of African Societies of Chemistry. However, at this time the European Association for Chemical and Molecular Sciences (EuCheMS) has expressed reservations about participating.

Among the issues that must be resolved very soon are those of financial commitments, potential costs, location, program, and the governance model.

Another meeting of the interested parties will take place during the ACS National Meeting in Boston in August.

New Members

Invitation to attend a meeting

You are cordially invited to attend one of our upcoming Section meetings as a guest of the Section at the social hour and dinner preceding the meeting.

Please call Anna Singer at 781-272-1966 between 9am-6pm, or email: secretary(at)nesacs.org by noon of the first Thursday of the month, letting her know that you are a new member.

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methods, you can go to factors of 10 or more below that level using super-resolution.”

**Early Years**

Moerner was born on June 24, 1953, at Parks Air Force Base in Pleasanton, California. He grew up in Texas, where he attended Thomas Jefferson High School in San Antonio. His activities during high school included becoming an Eagle Scout.

Beyond the truly critical role of his parents, he was encouraged to excel by Mrs. Gates in the Math department at Longfellow Junior High. At Jefferson, he had many favorite teachers, but perhaps the most important was Mrs. Blanche Rodriguez, the counselor who encouraged him to apply for a Langsdorf Fellowship to attend Washington University in St. Louis for undergraduate studies as an Alexander S. Langsdorf Engineering Fellow, and obtained three degrees: a B.S. in physics with Final Honors, a B.S. in electrical engineering with Final Honors, and an A.B. in mathematics *summa cum laude* in 1975. Talk about a total Science Technology Engineering & Math (STEM) career. He had mastered all the STEM fields just in his undergraduate career.

This was followed by graduate study in solid state and chemical physics, partially supported by a National Science Foundation Graduate Fellowship at Cornell University in the group of Albert J. Sievers III. Here he received an M.S. degree and a Ph.D. degree in physics in 1978 and 1982, respectively.

**Industrial & Academic Career**

After college, Moerner was interested in doing research at one of the major industrial labs and was offered positions both at Bell Labs and at IBM in San Jose. He chose IBM: [http://www.research.ibm.com/articles/2014 Nobel.shtml](http://www.research.ibm.com/articles/2014nobel.shtml).

There he was able to join a team of talented chemists, physicists, and engineers to follow the motto of the lab at the time: “Be famous for your science and technology.” It was at IBM that he made the first of two major discoveries that were key to his role in the Nobel prize recognition. Moerner was investigating the potential for high-density optical data storage at IBM, both by physical effects known as spectral hole-burning and hologram formation by photorefractivity.

During the course of his research to determine fundamental limits to optical storage, he and his postdoc, Lothar Kador, became the first people to optically detect and image a single molecule.

Moerner was awarded the Nobel Prize in Chemistry for work contributing to the development of super-resolution microscopy – work that all started with that discovery at the IBM lab. Throughout the 1990s’ researchers all over the world completed a wide variety of optical studies of single molecules. Moerner spent 13 years at IBM, but in 1993 everything changed. IBM sales had been lagging for years, with sales lost to PCs and networking systems. They decided to write off $8B, lay off 10,000 employees [http://prospect.org/article/system-crash](http://prospect.org/article/system-crash), and rethink their role in the marketplace. Moerner took a sabbatical from IBM to work as a Visiting Guest Professor at ETH Zurich, and continued explorations of single molecules while laying the groundwork for a jump to academia.

Moerner joined the chemistry faculty at the University of California, San Diego, in 1995, and there began research on single molecules at room temperature. The freedom of the academic environment allowed him to explore the broader realm of biological applications of single molecules in collaboration with biochemists and biophysicists. It was at UCSD that he made the second major discovery, albeit somewhat by accident.

He and a postdoctoral researcher, Robert Dickson, were interested in determining if single copies of GFP could be optically detected and imaged. (As a side note, Osamu Shimomura of the Marine Biological Laboratory in Woods Hole, MA, was one of the discoverers to isolate the GFP molecule.) Shimomura spoke at the January 2012 NESACS meeting. Roger Tsien’s postdoc, Andy Cubitt, happily provided samples of a yellow variant of GFP for the experiments. Indeed, they could image single copies of GFP, but instead of staying brightly lit, the tags turned on and off in a random stochastic pattern. This property is essential to being able to use single copies of GFP to achieve super-resolution. Moerner said “They are like little beacons, or flashlights, telling us where the structure is and in precise detail going far beyond the optical limit of diffraction.” This has led to an entirely new way of looking at structures in fixed and living cells.

Moerner joined the Stanford faculty in 1998, attracted by the opportunity to apply his work to new fields. “I knew that Stanford was an incredibly

continued on page 13
June 2015 Meeting
Continued from page 12

exiting multidisciplinary environment with so many experts that it would be highly stimulating to my science over time, and indeed it has,” he said. “We use light to probe molecules, and that involves physics and chemistry. We apply this to biology and biomedical systems. But it’s very important to do precise measurement and extract as much information as possible from a single object, and we do that with concepts from electrical engineering.”

Through collaborations with colleagues in medicine, biology, applied physics and electrical engineering, Moerner has helped reveal key details of how Huntington’s disease proteins form tiny subwavelength aggregates that can damage the brain, how bacterial proteins regulate DNA replication and cellular division in time and space, and the precise structures and behavior of the cellular antennas that, if mutated, can trigger various diseases in humans. This is the prototype of a STEM team that is needed to keep the USA competitive in the future, and government funding of R&D is a necessary part of this research

Family & Researchers
Moerner and his wife, Sharon, have one son, Daniel, who is working for a doctoral degree in philosophy at Yale University. Prof. Moerner has been a thesis advisor for 26 graduate students and has mentored more than 45 postdoctoral researchers. Stanford professors, a graduate student and postdoctoral scholar reflect on the work of Professor W.E. Moerner in the following video: http://news.stanford.edu/features/2014/nobel/.

Moerner noted that throughout his career, much of the Nobel-winning work has been funded in part by the Office of Naval Research, the National Institutes of Health, the National Science Foundation, the Department of Energy, and several other federal granting agencies. “The support of this type of fundamental research from federal funding sources needs to continue and increase,” he said.

“The path-breaking work of Professor Moerner and his colleagues has made a major contribution to our ability to observe molecules at the smallest scales, opening up new possibilities for discovery in areas ranging from disease management to drug development,” Stanford President John L. Hennessy said. “The Nobel Prize recognizes this remarkable work, of which all of us in the Stanford community are immensely proud.” This is the fifth Nobel Prize awarded to Stanford faculty in the past three years.

We were pleased to have Prof. Moerner talk to our group at NESACS on June 11, 2015 at Nova Biomedical Corp. in Waltham, MA.

Jennifer and I picked up W.E. at his hotel and drove him to Nova Biomedical. We discussed a number of topics like my new red sports car, climate change, why groups like the ACS don’t have a Nobel Laureate symposium for their members, his work on the Nobel prize, some background on PID Analyzers, Nova and NESACS. We spent a very enjoyable hour ride to Nova but it was entirely too short. Jen and I found W.E. to be very personable and easy to talk to.

After arriving at Nova, Prof. Moerner had a discussion with the Nova principals about medical technology and critical clinical measurements. We had a tour of Nova’s manufacturing operations in Waltham. All of Nova’s instrumentation and diabetes strips are manufactured in the USA.

Following the tour, we went to the reception area. There were about 90 people for the reception, dinner, and lecture. There was an air of excitement and a real buzz in the air. His hand must have been sore because everyone wanted to meet him and shake his hand.

The Story of Light and Single Molecules, from Early Spectroscopy in Solids, to Super-Resolution Nanoscopy in Cells and Beyond
Prof. Moerner began with a description of the early days and initial discovery of single molecules, which occurred in 1989 at IBM Research. This was a story of high resolution spectroscopy at low temperatures, exploration of fundamental limits, and optimization of signal-to-noise ratio to achieve the ultimate limit. He then described how room temperature optical detection of single fluorescent molecules is accomplished today. Imaging of single copies of labeled proteins at low concentration in cells enables researchers to see the diffusional motion in membranes, to observe cell walls under construction, and even to detect defects in crystals.

To achieve super-resolution imaging, one must combine single-molecule imaging with two additional steps: First, the image of a single molecule, which looks a bit like a mountain when displayed in 3D, is used to find the position of the molecule with very high precision. Second, the experimenter must choose a method to force the emitting concentration to be low for every imaging frame. This can be accomplished by photochemistry, by natural blinking, by binding to fixed sites or membrane receptors, or by enzymatic reactions. Then, by recording a movie of sparse single molecules, the positions of all of them can be put together to create a pointillist reconstruction with detail far below the diffraction limit. This approach has now been used to discover many previously hidden mysteries of cell biology, such as bands of proteins in the axons of neurons, as well as the examples mentioned above. We now stand on a frontier of using single-molecule emitters to show nanoscale structures in a variety of complex cellular and materials environments.

I had about twenty emails from our NESACS members after W.E.’s excellent talk thanking me for bringing him to our NESACS monthly meeting. I never had such a response before. The NESACS younger chemists were very impressed and asked us for a contact at Woods Hole Oceanographic Institution so that they could bring a group down during the National Meeting in Boston. The areas that interested them were optical microscopy and imaging.
2015 NESACS Election Results

Chair-Elect (1 elected)
- *Leland L. Johnson, Jr. 189
- Raj (SB) Rajur 140

Secretary (1 elected)
- *Michael Singer 295

Trustee (1 elected)
- John N. (Jack) Driscoll 139
- *Peter C. Meltzer 159

Auditor
- *Patrick Gordon 284

Councilor/Alternate Councilor (4/4 elected)
- *Katherine Lee 275
- *Catherine E. Costello 269
- *Ruth Tanner 262
- *Michaeline Chen 218
- *Alt-Kenneth Mattes 212
- *Alt-Jackie O’Neil 211
- *Alt-Andrew Scholte 209
- *Alt-Jerry P. Jasinski 199
- Leland L. Johnson, Jr. 197
- R. Christian Moreton 155
- Ray Borg 162
- Mukund S. Chorghade 168
- Ajay Purohit 119

Director-at-Large (2 elected)
- June Lum 165
- *Ioannis Papayannopoulos 187
- *Christine Jaworek-Lopes 214

Nominating Committee (2 elected)
- *Anna Waclawa Sromek 177
- *John Williams 152
- Andrew Scholte 96
- James Phillips 131

Richards Medal Award Committee (2 elected)
- *Sheila Hauck 196
- John Caradonna 175
- *Mary Jane Shultz 202

Esselen Award Committee (2 elected)
- *Karen N. Allen 221
- Mukund S. Chorghade 97
- *David R. Walt 166
- Brian Provencher 99

Ballot counting committee: Kevin B. Chandler, PhD (Chair), Rebecca Glaskin, PhD, Qi Wang, PhD, Bo Yun, PhD

NERACS Board
Continued from page 7

The next annual meeting of the NERACS Board will take place at NERM 2016.

The author thanks Tom Gilbert for providing much of the material for this article; this reporter had to leave the meeting early to catch his flight to Ottawa (via Philadelphia!). ♦

Esselen Nominations
Continued from page 6

and technical press news or feature articles indicative of public benefit and interest. Further information is available at www.nesacs.org.

Nominations Are Due October 15, 2015 to karl@amgen.com with cc to piper281@verizon.net. Award recipients will be notified by February 1, 2016.

Inquiries may be directed to the above or to Dr. Karl Hansen, Tel. (617) 417-7147 or Karen Piper, Tel. (978) 456-8622. Address: 19 Mill Rd., Harvard, MA 01451. ♦

Regional Meeting Abstract
Continued from page 9

Byetta, Victoza), but these require inconvenient daily injections. Drugs that slow the breakdown of GLP-1 such as (i.e., Januvia) are also available.

We, and others, have proposed that GLP-1 secretagogues, alone or in combination with drugs that inhibit the breakdown of GLP-1, can be used as effective treatments for T2DM. Despite intense interest from the pharmaceutical and biotech communities, there currently exist no approved drugs based on the up-regulation of GLP-1 release. We expect that orally administered GLP-1 secretagogues would constitute an entirely new class of blood glucose-lowering agents.

This lecture will summarize our discovery of GLP-1 secretagogues and the identification of the TRPA1 receptor as its cellular target. They are easily prepared in a single chemical transformation by means of our novel three-component cycloaddition reaction using commercially-available reagents. Each of these starting materials can be independently varied, thereby facilitating the rapid construction of large libraries for structure-activity relationship studies. ♦

Q. Exactly, how many awards and scholarships does NESACS sponsor?
A) One  b) Two  c) Many

www.nesacs.org/awards
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US EPA

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Warner Babcock Institute

Dr. Sherine O. Obare
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April 2015 Meeting Photos

Photographs by Joel Laino

Dr. Mukund Chorghade, Chair of the Esselen Award Committee, visits with Prof. Jacobsen and Prof. William Klemperer, 2006 Chair of the Esselen Award committee, and his wife Beth.

Joan Esselen Foot with her husband “Buck” and her grandson Brendan Kelly have come from Minnesota to attend the Esselen Award ceremonies. Joan is the daughter of the founder of the award and granddaughter of the person it honors.

Joe Billo, 2004 chair of the Esselen Award committee visits with Patrick Gordon and Mike Filosa at the Esselen Award reception.

Arthur Obermayer, founding member of the Esselen Award committee, visits with Dorothy Phillips and Peter Meltzer at the reception.

Seated at the head table (l to r) are Jennifer MacLachlan; Dr. Mukund Chorghade, chair of the Esselen Award committee; Prof. Eric Jacobsen, 2015 Awardee with his wife Virginia. Standing (l to r) are Mrs. Myra Gordon; Prof. Roy Gordon, 1996 awardee; Prof. Jerry Jasinski, NESACS Chair-elect; and Prof. Stephen Buchwald, 2010 Esselen Awardee, who introduced Prof. Jacobsen at the Award ceremonies.

The Esselen family is represented by (seated l to r) Brendan Kelly; Joan Esselen Foot; her brother Gustavus John “Jack” Esselen IV, who will present the Award at the ceremony; Jack’s wife Catherine. Standing (l to r) “Buck” Foot; Jane Esselen Blocker, sister of Joan and Jack who came from Florida for the award; Dr. Katharine Esselen, daughter of Catherine and Jack; and Timothy Poole.
Changes in the Printing of the Nucleus

Opt-in for a Mailed Hardcopy - Effective December 1, 2015

by Michael Filosa

Over the last two years the Nucleus has been losing its advertisers as they move to alternative methods of seeking new customers. Historically, a substantial portion of the Nucleus budget has been covered by advertising revenues. The drop in these revenues has resulted in a deficit for the Northeastern Section which must be reduced. Approximately 2/3 of the cost of producing the Nucleus is printing and mailing. The vast majority of local sections of the ACS no longer mail their newsletter to their members except in a limited way.

After substantial discussion at the May and June meetings it was decided to eliminate the vast majority of mailed copies of the Nucleus. All members with a valid email address will receive a link to download a pdf version of the Nucleus. This option has been available for members for several years and is the default situation for new members to NESACS. However, NESACS still prints and mails over 4000 copies of the Nucleus to our members. Effective December 1, 2015 NESACS members will have to specifically request a printed version of the Nucleus be mailed to their mailing address.

At this point we are refraining from eliminating all mailed copies. Stay tuned for details in future issues of the Nucleus, the NESACS Website and the NESACS Facebook and LinkedIn pages.

What exactly goes on at NESACS’ monthly Board meetings?

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Check the NESACS home page for late Calendar additions: [http://www.NESACS.org](http://www.NESACS.org)

**Help Host our National ACS Members**

NESACS is hosting the Hospitality Booth at the ACS meeting in Boston!

We are asking NESACS members to help host our National ACS members by choosing a two hour time slot (you can choose more than one) available from Saturday, August 15th thru Thursday, August 20th.


---

**Recommended Events**

**Thursday, August 13, 2015**

PRES: National Historical Chemical Landmark Designation: Edwin Land and Instant Photography
3:30pm-6:30pm
(Reception will immediately follow)
MIT Museum
265 Massachusetts Avenue
Cambridge, MA 02139
RSVP required: [http://t.co/92Sw1y55J](http://t.co/92Sw1y55J)

**Friday, August 14, 2015**

A Celebration of Polaroid and Edwin Land
An Event for the Community
MIT Museum
5-8 PM
Cambridge, MA

**Sunday, August 16, 2015**

HIST: Edwin Land and Instant Photography: Massachusetts’ First National Historic Chemical Landmark
2-6 PM Room
50 - BCEC

**Sunday, August 16, 2015**

PROF: Professional Legacy of Henry Hill
1:30-4:20 PM
210C-BCEC

**Monday, August 17, 2015**

SCHB: The Legacy of Henry Hill: Commercial Enterprises in the Polymer Sector
1:15 -4:45 PM
Webster-Westin Boston Waterfront

**Monday, August 17, 2015**

CHED: Careers for Young Professionals in Green Chemistry: Breaking Bad Chemistry Habits 8:30 AM-12:20 PM
Room 207 – BCEC

**Monday, August 17, 2015**

Monday, August 17, 2015 YCC: Younger Chemists Exchanging More than Currency: First—Euros and Dollars; Next—Rupees, Rand, and Reais
8:45 AM-4:05 PM
Plaza Blrm B - Seaport World Trade Center

**Monday, August 17, 2015**

HIST: Edwin Land and Instant photography: An ACS National Historic Chemical Landmark
8 -10 PM
SCI-MIX, Hall C-BCEC

**Tuesday, August 18, 2015**

SCHB: Starting-Up & Spinning-Out: Commercializing Innovative Chemistry
8 AM -4:15 PM
Webster - Westin Boston Waterfront

**Tuesday, August 18, 2015**

Henry A. Hill Award and Reception
5:00 PM-7:00 PM
Seaport Hotel Plaza Ballroom A/B