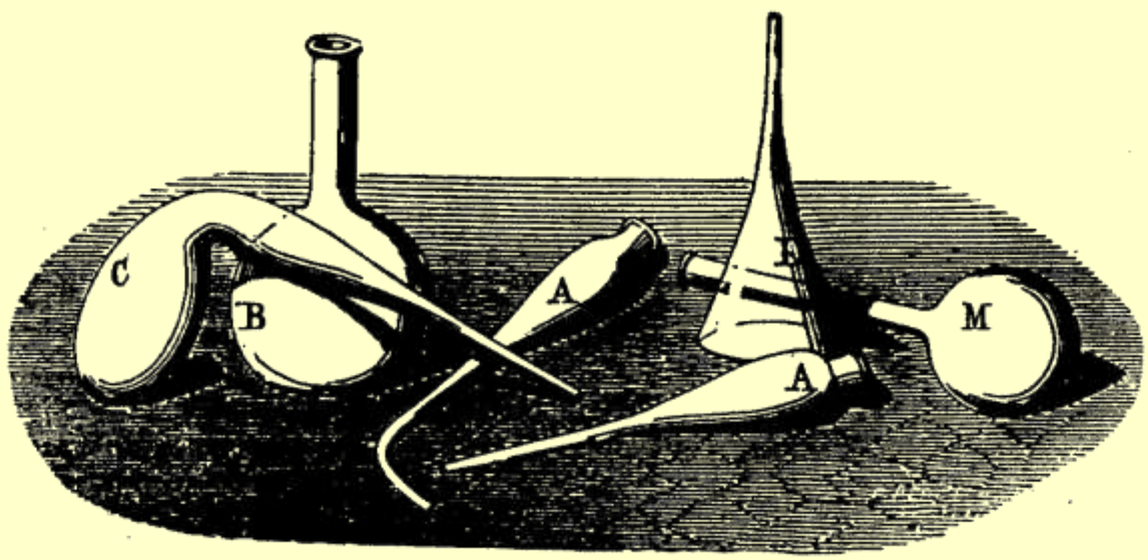
American Chemical Society

DIVISION OF THE HISTORY OF CHEMISTRY



PROGRAM & ABSTRACTS

254th ACS National Meeting
Washington, DC
August 20-24, 2017

S. C. Rasmussen, Program Chair

Final Program
HIST

DIVISION OF THE HISTORY OF CHEMISTRY

S. C. Rasmussen, *Program Chair*

SUNDAY AFTERNOON

Section A

Grand Hyatt Washington - Constitution Ballroom C

1:00 - 1:30 HIST Business Meeting (Open to all HIST members)

HIST Tutorial & General Papers

S. C. Rasmussen, *Organizer*, *Presiding*

1:30 HIST 1: HIST Tutorial: Polymer chemistry before Staudinger. **S. C. Rasmussen**

2:15 Intermission

2:30 HIST 2: Iodine and its fascinating history. **N. V. Tsarevsky**

3:00 HIST 3: Woodward's birth centennial: A philatelic tribute. **D. Rabinovich**

3:30 HIST 4: Grassroots advocacy for the sciences: A case history from the National Coalition for Science and Technology (1981-87). **D. L. Garin**

Analytical Chemistry in the Context of Cultural Heritage

Sponsored by ANYL, Cosponsored by HIST

SUNDAY EVENING

Grand Hyatt Washington - Lincoln Boardroom

5:00 - 8:00 HIST Executive Committee Meeting

MONDAY MORNING

Section A

Grand Hyatt Washington - Constitution Ballroom C

History as Outreach: Celebrating the ACS Landmarks Program's 25th Anniversary

A. J. Rocke, *Organizer*
V. V. Mainz, *Organizer, Presiding*

8:30 HIST 5: Introductory remarks: A quarter-century of chemical landmarks. **A. J. Rocke**

9:00 HIST 6: Roots of the national and the international programs. **N. D. Heindel**

9:30 HIST 7: Peripatetic Priestley. **R. G. Anderson**

10:00 Intermission.

10:15 HIST 8: Ivermectin: A cure for a deadly and torturous scourge. **M. Orna**

10:45 HIST 9: Connecting chemistry to society and culture. **M. Meyer**

11:15 HIST 10: From Bakelite to biochemistry: Highlights from the National Museum of American History's collections. K. Frederick-Frost, **M. Warner**

11:45 Panel Discussion

Analytical Chemistry in the Context of Cultural Heritage

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MONDAY AFTERNOON

Section A

Grand Hyatt Washington - Constitution Ballroom C

HIST Tutorial & General Papers

S. C. Rasmussen, *Organizer*, *Presiding*

1:30 HIST 11: Story of a long-lasting chemistry textbook and its authors. **W. Palmer**

2:00 HIST 12: Chemistry in a library. **A. Davis**

2:30 HIST 13: Scientific American and its influence on the public understanding of the chemical sciences, Part I:1846-1866. **M. D. Saltzman**

3:00 Intermission.

3:15 HIST 14: Items of interest to chemists from the pages of Scientific American for chemists, Part I: 1846-1866. **M. D. Saltzman**

3:45 HIST 15: Baking powder wars: A history of chemical leavening. **L. Civitello**

4:15 HIST 16: Contribution of medical missionaries to the introduction of chemistry and industries in Korea. **C. H. Do**

Analytical Chemistry in the Context of Cultural Heritage

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MONDAY EVENING

Section A

Walter E. Washington Convention Center - Halls D/E

Sci-Mix

S. C. Rasmussen, *Organizer*

8:00 - 10:00

HIST 1, HIST 4, HIST 15. See previous listings.

TUESDAY MORNING

Section A

Grand Hyatt Washington - Declaration AB

Ladies in Waiting for Nobel Prizes: Overlooked Accomplishments of Women Chemists

Cosponsored by PRES, PROF and WCC‡
E. T. Strom, *Organizer*
V. V. Mainz, *Organizer, Presiding*

8:25 Introductory Remarks.

8:30 HIST 17: Women scientists: An uphill battle for recognition. **M. Hargittai**

9:00 HIST 18: Should the 1932 Nobel Prize be awarded to Langmuir, Pockels and Blodgett. **B. H. Davis**

9:30 HIST 19: Lise Meitner: Overlooked Leadership in the Discovery of Nuclear Fission. **J. L. Curtis-Fisk**

10:00 Intermission.

10:15 HIST 20: Who got Marietta Blau's Nobel Prize? **V. L. Trimble**

10:45 HIST 21: Ida Noddack-Tacke, the actual proposer of nuclear fission before Hahn. **J. L. Marshall, M. Orna**

11:15 HIST 22: Katharine Burr Blodgett: A brief account of her remarkable life and work. **M. E. Schott**

11:45 HIST 23: Erika Cremer and the origins of solid state gas chromatography, 1944-1947. **J. A. Johnson**

TUESDAY AFTERNOON

Section A

Grand Hyatt Washington - Declaration AB

Ladies in Waiting for Nobel Prizes: Overlooked Accomplishments of Women Chemists

Cosponsored by PRES, PROF and WCC‡
E. T. Strom, *Organizer*
V. V. Mainz, *Organizer, Presiding*

1:30 HIST 24: Kathleen Yardley Lonsdale, pioneering crystallographer and peace activist. **M. Julian**, M. Orna

2:00 HIST 25: Birth of Environmental Chemistry. Rachel Carson, the courageous author and scientist that gave rise to the EPA. **A. H. Coffman**

2:30 HIST 26: Vive le francium. Marguerite Perey, discoverer of the last natural element. **S. S. Preston**

3:00 Intermission.

3:15 HIST 27: Rosalind Franklin: Her pathway to DNA. **B. H. Davis**

3:45 HIST 28: Professor Emerita Darleane C. Hoffman. **C. F. Mason**

4:15 HIST 29: Always a nominee, never a Nobelist. **V. V. Mainz**

TUESDAY EVENING

Grand Hyatt Washington - Constitution Ballroom B

5:30 - 6:30 No Belles

ABSTRACTS

HIST 1 - HIST Tutorial: Polymer chemistry before Staudinger

***Seth C. Rasmussen**, seth.rasmussen@ndsu.edu. Department of Chemistry and Biochemistry, North Dakota State University, Fargo, North Dakota, United States*

Polymers and plastics comprise one of the most ubiquitous chemical technologies of modern society. Although the modern concept of the macromolecule only dates from 1920, polymer chemistry predates this by roughly a century. Beginning with the chemical modification of natural polymers, chemists began the full synthesis of polymeric materials from monomeric precursors as early as 1834. Early examples of such synthetic polymers include polyaniline, polystyrene, cuprene, and polyisoprene. Of course, this discussion is also complicated by the changing meaning of the term "polymer". A presentation of this linguistic evolution and an overview of polymer chemistry up through 1920 will be presented.

HIST 2 - Iodine and its fascinating history

***Nicolay V. Tsarevsky**, nvt@smu.edu. Chemistry, Southern Methodist University, Dallas, Texas, United States*

Iodine was discovered (according to some apocryphal stories, by accident) in 1811 by the French chemist Bernard Courtois (1777-1838) who was preparing seaweed ashes for the manufacture of gunpowder. The new substance made its appearance on the chemistry stage as purple vapors, which, when cooled down, formed dark lustrous crystals. Samples were studied by a number of chemists, including, among others, Joseph-Louis Gay-Lussac (1778-1750), Louis Nicolas Vauquelin (1763-1829), and Humphry Davy (1778-1829). Briefly after the discovery of iodine, voluminous studies were published describing its properties and reactivity as well as many of its inorganic and organic compounds, and complexes (e.g., the blue-colored complex with starch). The first biogenic organic iodine compound was discovered in 1896 in the marine organism yellow gorgonia by Ferdinand Heinrich Edmund Drechsel (1843-1897), and that was followed by many more, including the thyroid gland hormones. Until 1886, when Conrad Willgerodt (1841-1930) studied the reaction of iodobenzene with chlorine, which produced the first known organic hypervalent iodine(III) compound, (dichloroiodo)benzene, only monovalent iodine organic compounds were known. Many more hypervalent iodine(III) and iodine(V) compounds have been discovered since then that have found wide application in organic synthesis. All major milestones in the history of iodine will be presented.

HIST 3 - Woodward's birth centennial: A philatelic tribute

***Daniel Rabinovich**, drabinov@uncc.edu. UNC Charlotte Chemistry, Charlotte, North Carolina, United States*

The first postage stamps honoring Robert Burns Woodward (1917-1979), one of the most accomplished chemists of the 20th century, were surprisingly released by two African nations only in 2015, a full half-century after the eminent scientist had received the Nobel Prize in Chemistry. This presentation will illustrate with stamps several milestones in the life and work of R.B. Woodward, from his astute proposal for the "sandwich" structure of ferrocene to the total synthesis of quinine and many other complex natural products. In addition, a detailed description of the two aforementioned "RBW" stamps, both of which have unexpected features, will be presented.

HIST 4 - Grassroots advocacy for the sciences: A case history from the National Coalition for Science and Technology (1981-87)

***David L. Garin**, garin@umsl.edu. Chemistry Biochem, University of Missouri-St. Louis, Saint Louis, Missouri, United States*

Proposed federal cuts to the science budgets today parallels problems that occurred when President Ronald Reagan took office in 1981. David Stockman was the Budget Director and his goal was to slash budgets as much as possible. Each Congressional office was attempting to challenge cuts in the area(s) of most importance to them. Few chose to support the sciences as a priority.

In response, a small group of Congressional Science Fellows started the National Coalition for Science and Technology. They quickly recruited an outstanding bipartisan Advisory Board which included present and past congressmen and present and former leaders of scientific societies. They raised some funds, hired an executive director and recruited members (more than 1200 scientists and educators). They wrote editorials, gave testimony at Congressional hearings, organized symposia, and advertised in scientific newsletters. Yet this well-organized, much needed effort had limited success in its mission to activate individual scientists.They kept the operation going for 6 years during which time the scientific societies became less reluctant to lobby Congress and the science budgets stabilized.

Is this history relevant to current efforts by ACS President Allison Campbell to promote science advocacy? The author, a cofounder of NCST, will review its history and explain why he believes that the current plan to activate chemists (ACS President Campbell's initiative) may be more successful than past attempts.

HIST 5 - Introductory remarks: A quarter-century of chemical landmarks

Alan J. Rocke, *ajr@case.edu. History (emeritus), Case Western Reserve University, Cleveland, Ohio, United States*

The speaker (who is the current chair of the National Historic Chemical Landmarks subcommittee) will provide an overview of the history and impact of the program, with some personal highlights.

HIST 6 - Roots of the national and the international programs

Ned D. Heindel, *ndh0@lehigh.edu. Department of Chemistry, Lehigh University, Bethlehem, Pennsylvania, United States*

The Executive Committee of the Division of the History of Chemistry considered creating an historic chemical landmarks program for many years, but the issue became an action item in 1992 during the chairmanship of Ben Chastain. The Chair-Elect, Jeffrey Sturchio, showed great enthusiasm for the idea, and a group of HIST officers met with Ann Messmore, Director of the ACS Office of Public Outreach, to implement the Division's own program. Sturchio and his colleagues studied similar programs created earlier by the Society of Agricultural Engineers (1926), the American Society of Civil Engineers or ASCE (1964), and the American Society of Mechanical Engineers (1971). These groups had long used "landmarking" events to call public attention to their respective professions. The HIST Task Force modeled very closely the ASCE's program in which documented nominations by individual members, divisions, or local sections trigger the selection process. This author served for a decade on the first Landmarks Advisory Committee and chaired that group from 1996 to 2000. This presentation covers the creation of policies on how to handle landmarking of trade-marked products, the nominations of "super-fund" sites, how to decide which of the countless pharmaceuticals deserved recognition, and how to collaborate with international societies - in Canada, France, England, Mexico, Germany, Hungary, and India - to dedicate landmarks outside the USA.

HIST 7 - Peripatetic Priestley

Robert G. Anderson, *randerson@chemheritage.org. Chemical Heritage Foundation, Philadelphia, Pennsylvania, United States*

Joseph Priestley (1733-1804) was the second chemist to be celebrated by the ACS National Chemical Landmarks scheme when, in 1994, two plaques were affixed to walls, one on his house and laboratory in Northumberland, Pennsylvania, and the other at Bowood House in Wiltshire, England. The decision to commemorate Priestley in this way makes a particular point: that scientists are not rooted to one particular spot in the conduct of their work, even in the eighteenth century, and that their movements not infrequently cross national boundaries. We are reminded of this today on every occasion a Nobel Prize is awarded, and several institutions make claim to the awardee.

Priestley led a particularly complicated life. In his day, he might have been thought of more of a radical Unitarian preacher than as a chemist. Equally, he would have been seen by some as an historian, educator and philosopher, both natural and moral. He was born near Leeds in Yorkshire and quickly showed his ability in his mastery of several languages. As a non-conformist, the ancient English universities were barred to him even if his social position would have allowed entry to them. After training as a minister, he taught first in Suffolk and then, after a spell of teaching at Warrington (and having met Benjamin Franklin in London) he was called to preach at a chapel back in Leeds. It was here that his scientific researches started to blossom, especially by his production of several new gases. He next went to work as a tutor an librarian on Lord Shelburne's estate in Wiltshire, and it was here that he conducted his famous experiments to make what he called dephlogisticated air.

His next move was to Birmingham, where his life became relatively settled until severely disrupted on 14th July 1791 when his house and laboratory were destroyed by a mob. He tried to settle down in Hackney, east London, but his reputation was not helped by his being offered citizenship by the revolutionary French government (even though he declined). So he decided to join his son in another revolutionary country, the United States, and it was in Northumberland that he rebuilt his laboratory and his life, from the age of 61. He stubbornly clung on to the increasingly outdated theory of phlogiston and published a number of papers on the subject before his death in 1804.

So if Priestley were to be commemorated with a third ACS plaque, where should it be?

HIST 8 - Ivermectin: A cure for a deadly and torturous scourge

Mary Virginia Orna*, maryvirginiaorna@gmail.com. Chemistry, The College of New Rochelle, New Rochelle, New York, United States*

When Merck & Company scientists in collaboration with Japanese colleagues at the Kitasato Institute examined some soil samples from a golf course, little did they realize that their research would lead to curing a world scourge, as well as a Nobel Prize. The results of their research are legendary, but the deployment decision was even more so. Not only did Merck, through its product, ivermectin, restore health and quality of life to millions, but it also did this gratuitously for sub-Saharan countries who lie at the bottom of the economic heap. Ivermectin is a "poster child" for the ACS vision of "improving people's lives through the transforming power of chemistry" and its mission to "benefit...Earth and its people."

HIST 9 - Connecting chemistry to society and culture

Michal Meyer*, mmeyer@chemheritage.org. Chemical Heritage Foundation, Philadelphia, Pennsylvania, United States*

In classes and labs chemistry students are taught the practice and theory of chemistry—they are being trained in how to do chemistry. But where does that leave the majority of students who will never be chemists? They may get a class on consumer products or a class that aims to help students understand "the role and impact of modern chemistry in society."

But what if students could take a class on one of the oldest of human endeavors, one that has sought to manipulate the world as well as to understand it? Of all the sciences, chemistry has the best true stories, stories that tell us about people, societal concerns, politics, history and culture, and of how our understanding of the natural world has changed over time. This would be the long view of chemistry, one in which artisans would get as much respect as atomic theorists and where Isaac Newton's work in the Royal Mint to reform the English currency would stand beside his alchemical work. And where the personal trials of Fritz Haber would stand alongside the rise of German chemistry. Such an approach would discuss how 19th century chemists encountered arsenic in consumer goods and how that encounter led to the creation of the first consumer protection laws. And why in the 20th century new analytical instruments were critical to the EPA's work, and how the latter could not have existed without the former.

Such students would not become chemists, but they would have a sense of the depth and breadth of chemistry as a human endeavor, perhaps a better sense than the chemists themselves.

HIST 10 - From Bakelite to biochemistry: Highlights from the National Museum of American History's collections

Kristen Frederick-Frost[1], ***Mallory Warner[2]****, WarnerM@si.edu. (1) Curator of Modern Medicine, Division of Medicine and Science, National Museum of American History, Washington, District of Columbia, United States (2) Curatorial Assistant, Division of Medicine and Science, National Museum of American History, Washington, District of Columbia, United States*

In 1993, the ACS kicked off its National Historic Chemical Landmark program by commemorating a rather interesting object at the National Museum of American History—the Bakelizer. This iron-alloy steam vessel was used around 1909 to make large batches of Leo Baekeland's thermosetting resin, Bakelite, the first fully synthetic plastic. Unlike many of the ACS landmarks, the Bakelizer is an object and not a location.

Just as the NHCL program uses historic places to explore the history of chemistry, objects in NMAH's chemistry collections highlight the multitude of ways that chemistry has affected American life. Some of these objects are well known, like the Bakelizer, and others, like a "silk" purse made from a sow's ear, are not. They have been collected over lifetimes and for different reasons. This talk will only hint at the variety of NMAH's holdings and the stories that inspire curiosity and further research. From museum exhibits to online object groups, we use historical artifacts to explore the changing nature of chemistry and its related fields.

HIST 11 - Story of a long-lasting chemistry textbook and its authors

***William Palmer**, drspalmer@optusnet.com.au. SMEC, Associate, Curtin University of Technology, Brighton, Victoria, Australia*

As early as 1907, a group of New York teachers started writing secondary school chemistry and physics textbooks. Eventually the textbooks that they wrote became one of two major series of textbooks that dominated the secondary school physical science market in America for half a century. In chemistry, their first title was First principles of chemistry. Over the next few decades, this group of teachers changed the title of the book twice though the substance of the book remained essentially the same. They added consistently to this stable of books including practical texts and teachers guides to suit different ability groupings and teaching styles. The seven authors for whom brief biographies will be provided will be: Raymond Bedell Brownlee, Robert Warren Fuller, William J. Hancock, Michael Druck Sohon, Jesse Elon Whitsit, Paul J. Boylan and Philip J. Weld. The first five teachers in the group were the original authors, whilst Boylan and Weld became replacement authors after the death or retirement of some of the original group. The book's story from its inception to its final reincarnation as Elements of chemistry in 1943 and continuing until 1969 is the story of the teaching of chemistry in American secondary schools in the first half of the twentieth century

HIST 12 - Chemistry in a library

***Andrew Davis**, adavi@loc.gov. Preservation Research & Testing, Library of Congress, Catonsville, Maryland, United States*

Just a few miles away from both the American Chemical Society headquarters as well as its 254th National meeting, the Library of Congress is home to some interesting notes of chemical history, such as Thomas Jefferson's personal chemistry library highlighting his correspondence with Joseph Priestly. This talk will present one of the more curious collections at the Library of Congress: the testing books of paper chemist William J. Barrow. In the mid-1900s Barrow undertook an ambitious study of 1000 books printed as far back as the 16th century, meticulously recording their chemical and physical properties. By correlating book conditions to their papers' chemical compositions after centuries of natural aging, Barrow and his laboratory offered systematic predictions of paper aging and longevity which have received both accolades and criticism. These test books now reside in the Library's Preservation Research and Testing Division, and their past and future influence on the chemistry of paper preservation will be discussed.

HIST 13 - Scientific American and its influence on the public understanding of the chemical sciences, Part I: 1846-1866

***Martin D. Saltzman**, msaltzmn@providence.edu. Natural Science, Providence Colg, Providence, Rhode Island, United States*

For the United States, the founding of *Scientific American* proved to be the one nationally distributed publication in which those interested in the developments in the natural sciences as well as technology could find what was occurring. This paper will discuss after an introduction to the story of *Scientific American* in this first twenty year period of its existence sections on the beginnings of chemical reporting in this period both domestic and foreign. Detailed reports of the works of William Crooks, John Tyndall, W. H. Perkin and A. W. von Hofmann. Coverage of Michael Faraday's public lectures was extensive and will be included in the paper. Work of a non-chemical nature of interest will be that of Charles Lyell, Louis Agassiz and Louis Pasteur.

HIST 14 - Items of interest to chemists from the pages of Scientific American for chemists, Part I: 1846-1866

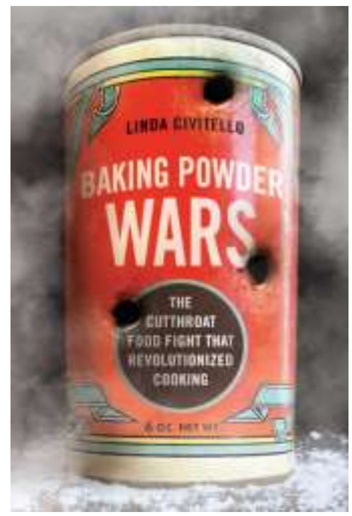
***Martin D. Saltzman**, msaltzmn@providence.edu. Dept Natural Sci, Providence Colg, Providence, Rhode Island, United States*

In the course of my research on *Scientific American* and American chemistry I have come accrosss numerous items that form an interesting melange from the period 186-1866. These include illustrations of chemical apparatus used in commercial applications, classified advertisements. These fall into the categories of education for future and practicing chemists, sources of chemicals, situations wanted and news of new books available. A selection of these will be presented by the presenter.

HIST 15 - Baking powder wars: A history of chemical leavening

***Linda Civitello**, lcivitello@ucla.edu. Independent Scholar, Los Angeles, California, United States*

Baking powder is a chemical leavening shortcut as revolutionary as the discovery of yeast fermentation that created leavened bread in the Fertile Crescent approximately six thousand years ago. Chemical additives in food are routine in the twenty-first century, but they were new in the nineteenth. Baking powder was one of the first products that broke down the dam for the chemical flood in foods. Feeding a particularly American need for speed, baking powder created new fast foods such as baking powder biscuits, cookies, and quick breads. Baking powder made cakes, pancakes, waffles, doughnuts, crullers, and muffins easier to prepare, cheaper, and shortened their cooking time radically. Much of America's global culinary hegemony is related to baking powder through multinational businesses such as McDonald's, Kentucky Fried Chicken, Denny's, The International House of Pancakes, Dunkin' Donuts, and Starbucks.



The Baking Powder Wars are the Hundred Years' War of business. This Hobbesian struggle for Darwinian survival of the fittest was a series of wars: scientific, advertising, trade, legislative, judicial. They were fought among companies with the same chemical formula, among companies with different formulas, between government agencies, in the legislature of almost every state and territory in the United States, in the United States Congress, within federal agencies, and between federal agencies and baking powder businesses. There were wars among female consumers loyal to different brands, in cookbooks, and among women in the new field of home economics. The Baking Powder Wars reached to the United States Supreme Court, to the White House, and into kitchens worldwide. Baking powder even caused the downfall of the top chemist in the United States at the time, Harvey Washington Wiley.

HIST 16 - Contribution of medical missionaries to the introduction of chemistry and industries in Korea

***Choon H. Do**, choondo@sunchon.ac.kr. Korean Chemical Industry Specialists Association, Busan, Korea (the Republic of)*

The practical first introduction of western chemistry and other natural sciences and medical science into Korea was mainly by the medical missionaries in late 19th century although the knowledge on the western sciences was slowly introduced into Korea through envoys travelling to China from 17th century. We would like to describe some examples of the activities. Horace G. Underwood (1859-1916) arrived in Korea as missionary in 1885 after studying medicine for one year in preparation and joined the first western medical school in Korea, Jejungwon Medical School established in 1886, and taught chemistry and physics. Henry G. Appenzeller (1852-1902) arrived in 1885 and established Pai Chai Academy, and offered courses including chemistry. One of the first graduate of Jejungwon Medical School, Seo-yang Park (1885-1940) taught chemistry course in several high schools. We will discuss more in details.

HIST 17 - Women scientists: An uphill battle for recognition

***Magdolna Hargittai**, hargittai.magdolna@gmail.com. Department of Inorganic and Analytical Chemistry, Budapest University of Technology and Economics, Budapest, Hungary*

The Nobel Prize, for well over a century, has brought science into the limelight annually by honoring a few exceptional achievements. There are many deserving scientists worthy of the Prize, but only a few ever become winners. Thus, many—men and women—who deserve it, do not get it. But women are especially underrepresented among recipients. In our male-oriented society, historically, relatively few women had the conditions for fulfilling the promise of their talent and yet fewer had received proper recognition when they succeeded. Although the situation has slowly improved, women are still strongly underrepresented in the higher echelons of science.

It is important that we remember women scientists of the past whose achievements were at least on a par with the achievements of their male contemporaries, but nonetheless remained without the highest recognition. Lise Meitner, Ida Noddack, Rosalind Franklin, Chien-Shiung Wu, Marietta Blau, Jocelyn Bell Burnell, Vera Rubin, and Isabella Karle are just a few of them.

Often women scientists are shortchanged in the process simply because those submitting nominations for the Nobel Prize (and other awards) do not even think of putting the names of women forward. We need to increase awareness about women scientists whose achievements would merit the highest recognition. This would enhance their chances for recognition with the added bonus of creating more role models for other women in science as well as those contemplating scientific careers.

In a similar vein, we need to increase awareness of women scientists' achievements in the context of academic promotions, professorial appointments, and academy memberships. It would be an important step forward for women to have equal chances of being considered for recognition whether for promotion or awards at any level, including the Nobel Prize.

HIST 18 - Should the 1932 Nobel Prize be awarded to Langmuir, Pockels and Blodgett

***Burtron H. Davis**, burtron.davis@uky.edu. Univ of Kentucky, Lexington, Kentucky, United States*

Irving Langmuir received the 1932 Nobel Prize for Chemistry in 1932 for "his outstanding discoveries and investigations in surface chemistry." The basis of the prize included the spreading of an oil film and a determination of the lateral pressure with which such a film opposes attempts to diminish its surface. In the presentation speech it was stated "the greatest honor is due to the first man, the pioneer, who has broken new ground, than to the cultivators of ground already cleared, however industrious they may be." By this definition, Agnes Pockels should have been included since she did the pioneering work on the spreading of an oil film. Blodgett's work on films was pioneering but it may not have been advanced enough by 1932 for her to be considered for the Prize.

HIST 19 - Lise Meitner: Overlooked leadership in the discovery of nuclear fission

***Jamie L. Curtis-Fisk**, jlcurtisfisk@dow.com. The Dow Chemical Company, Freeland, Michigan, United States*

Lise Meitner was a pioneer physicist in radioactivity and nuclear physics, part of the team that discovered nuclear fission. With fellow physicists Otto Hahn, she led the group that first discovered nuclear fission of uranium, publishing these results in 1939. The understanding they developed on the tremendous amount of energy released when uranium was split into smaller nuclei was key in the development of the nuclear weapons used during WWII and is the technology now utilized by nuclear reactors to generate electricity. She was also the first woman to become a full professor of physics in Germany and the department head at the Kaiser Wilhelm Institute. Despite her leadership in developing this technology, only her collaborator was awarded the Nobel Prize for the discovery in 1944. This has long been considered unjust, especially after the records of the committee were opened in the 1990s, resulting in many honors being posthumously awarded to Dr. Meitner. Most notably, an element was named after her, "Meitnerium." While her contributions were not adequately acknowledged during her lifetime, the impact she has made on physics continues to be recognized as one of the top "Belles" to have been overlooked for a Nobel Prize.

HIST 20 - Who got Marietta Blau's Nobel Prize?

***Virginia L. Trimble**[1,2], vtrimble@astro.umd.edu. (1) Univ of California Irvine, Irvine, California, United States (2) Queen Jadwiga Observatory, Rzepiennik, Poland*

Marietta Blau (1894-1970, both Vienna) developed the use of nuclear emulsions for tracking and identifying relativistic particles from radioactive materials, accelerators, cosmic rays, and particularly, for inventorying the spray of particles emerging when nuclei are disintegrated by very high energy collisions (also called spallation). The emergent tracks look like a distorted Christmas star, accounting for the title of a Blau biography, Stars of Disintegration (B. Strohmeier & R. Rosner, 2003). She was one of a small group of European women for whom time, place, gender, and ethnicity combined to yield serious under-recognition and varyingly traumatic lives. Lisa Meitner and Rosalind Franklin, discussed elsewhere in this session, are other examples. Curiously the three looked very much alike early in their lives. Blau earned her PhD in 1919 at the University of Vienna, working with Stefan Meyer and Felix Exner. She was never properly paid at the Radium Institute in Vienna (before 1938 and after her 1960 return) and not always at various other places and times. Her crucial work was done before 1938, partly with student Hertha Wambacher, who died in 1950 and was probably truly a Nazi. Blau was nominated twice for the Physics Nobel Prize by Schroedinger (first with Wambacher in 1950, later alone) and also by Hans Thirring. But in 1950, there were 14 nominations of Cecil F. Powell to one for the women. He was the winner, alone, for the nuclear emulsion technique and its post-war use to discover the charged pi meson, having heard of the technique from Werner Heitler, who knew of Blau's work. Powell's solo prize could well have been shared with Blau, and Guiseppe Occhialini.

Blau lost possessions, time, health, and the opportunity to continue her research to the absolute necessity of leaving Austria in 1938 and of taking her widowed mother with her. Efforts by Albert Einstein were instrumental in finding a place for her in Mexico City as a professor at the Polytechnic Institute. Diana Kormos Buchwald of the Einstein Papers Project has generously given me copies of 11 items of relevant correspondence, some in German, some in English. After her mother's death and the end of the war, Blau moved to the United States (the Austrian and German quotas being wide open!), where she worked in industry, at Columbia, Brookhaven, and elsewhere on a variety of investigations, many of which would now be called materials science.

HIST 21 - Ida Noddack-Tacke: The actual proposer of nuclear fission before Hahn

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Ida Eva Noddack-Tacke (1896 –1978) was born in Lackhausen, a suburb of Wesel, a town on the Rhine River 85 kilometers north of Köln (Cologne), Germany. She was the daughter of Adelberg Tacke, the owner of a varnish factory. Ida was educated at the Berlin Hochschule, earning her doctorate in engineering (Doktor-ingenieur) in 1921. She specialized in organic chemistry, thinking that she could improve the curing behavior of linseed oil in her father's business. After her graduation, however, she met Walter Noddack (1893-1960) and was smitten by his quest for new elements. She joined the Physikalisch-Technische Reichsanstalt, Berlin, in 1922 and they married four years later. The two researchers formed, as she called it, the Arbeitsgemeinschaft (work-unit) that held them together through mutual research and love in a manner reminiscent of Pierre and Marie Curie — some German journalists have called her "die deutsche Marie Curie." The pair discovered the element rhenium in 1925; the same year they made the spurious discovery of masurium (element 43; technetium). Ida independently proposed the concept of nuclear fission in 1934 before the dramatic announcement of Hahn, Strassman, Meitner, and Fritsch in 1939, and in her article "Über das Element 93" refuted the claim of Fermi that he had produced that element by neutron bombardment of uranium.

HIST 22 - Katharine Burr Blodgett: A brief account of her remarkable life and work

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Have you ever asked yourself the question, Who was the co-inventor named 'Blodgett' of the Langmuir-Blodgett duo? Their joint development of the so-called LB technique, which permits the creation of single-molecule-thick 2D layers on surfaces such as glass or metal, was widely adopted for academic and industrial applications following its publication in 1937. Raised in Schenectady, New York around the turn of the last century, Katharine Burr Blodgett (1898–1979) developed a keen interest in physics and optics as a student at Bryn Mawr College during the period of WWI. She went on to obtain a masters degree at the University of Chicago and then joined the staff at General Electric in Schenectady. While there, Dr Irving Langmuir encouraged Blodgett to pursue a doctoral degree in physical chemistry at Cambridge under the direction of Ernest Rutherford in order to attain a more senior position on GE's research staff. This talk will trace Blodgett's most significant breakthoughs in chemically related lines of work – most notably non-reflective glass and airplane wing de-icing – during her 40-year career at GE. Some humorous and interesting recollections about her personality and life away from the laboratory bench will also be highlighted. She loved her craft and made distinctive and long-lasting contributions.

HIST 23 - Erika Cremer and the origins of solid state gas chromatography, 1944-1947

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Erika Cremer (1900-1996) deserved the Nobel Prize in Chemistry for her pioneering work in independently developing the process of solid-state gas adsorption chromatography in 1944-45 in Innsbruck, Austria (then part of

Nazi Germany). In the spring of 1945 Cremer's preliminary report on the technique was in press in what would have been the last issue before the end of the war of Naturwissenschaften, the German version of Science. Unfortunately the press was bombed and the plates destroyed before it could be printed. Although Cremer's laboratory was also bombed and unusable for some time after the war, her graduate student Fritz Prior, working under her direction in a nearby high school laboratory, successfully tested her ideas by building a primitive gas chromatography device in 1946-47 as part of his PhD research. But postwar problems with German journals and overall limitations on scientific communications delayed their publications until 1951, and unfortunately they remained obscure for several years, even among German-speaking chemists. Meanwhile the Nobel Prize in Chemistry 1952 was awarded jointly to the British chemists A. J. P. Martin and R. L. M. Synge for their invention of liquid partition chromatography during the early 1940s; although Martin and A.T. James followed up on this by developing gas-liquid chromatography in 1950-52, Cremer's earlier independent work on solid-state gas adsorption chromatography, had it been known at the time, could have justified a third share of the 1952 prize for her. This paper will be based on published sources and on the author's interview with Erika Cremer in 1994.

HIST 24 - **Kathleen Yardley Lonsdale: Pioneering crystallographer and peace activist**

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Kathleen Lonsdale's early achievements in college physics brought her to the attention of W. H. Bragg, who offered her a position in his laboratory at University College London and later at the Royal Institution. After a brief time in Leeds after her marriage in 1927, she returned to work with Bragg until his death. Later she became Reader in Crystallography and, in 1949, Professor of Chemistry and Head of the Department of Crystallography at University College, London, thus becoming the first woman tenured professor there. Her major scientific accomplishments were studies in mathematical crystallography and space group theory in relation to the structure analysis of crystals, the structure of hexamethylbenzene and other simple aromatic compounds, proving the planarity of the benzene nucleus.

A devout Quaker, she always harbored a revulsion for the evil of war, and even went to prison as a result of her refusal to register for civil defense duties during World War II. According to her husband, this stay in prison was the single most formative experience in her career: after prison, she could take honors and accolades in stride, among them being named Dame Commander of the Order of the British Empire (1956). When she retired, she was kept busy by the enormous volume of correspondence concerned with peace and prison – and she kept on working even in her hospital bed where, in 1971, she died of cancer at the age of sixty-eight.

HIST 25 - **Birth of environmental chemistry: Rachel Carson, the courageous author and scientist that gave rise to the EPA**

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It might seem strange to honor a marine biologist and an individual that spent a great portion of her career fighting against large chemical companies at a symposium dedicated to women that enhanced the field of chemistry in remarkable ways. However, the courageous work of Rachel Carson inspired chemists to become more conscientious, the government to consider instigating regulations and the Environmental Protection Agency, and the formation of disciplines such as environmental biology and chemistry as well as Industrial Hygiene. Rachel Louise Carson used her skills as a scientist to collect data and evidence that illustrated the misuse and overuse of pesticides, particularly, dichlorodiphenyltrichloroethane (DDT). Additionally, she employed her talent as a *New York Times* bestseller author to publish her findings in the 1962 book *Silent Spring*. After defending her findings, in May 1963, Rachel Carson appeared before the Department of Commerce and requested the establishment of a "Pesticide Commission" to regulate the use of DDT. Ten years later, the "Pesticide Commission" became the Environmental Protection Agency, which immediately banned DDT. Presented here is an investigation of the various pesticides analyzed by Rachel Carson and the concentration levels identified in the soil, water, and bird specimens. Additionally, her progressive ideas to combat the use of pesticides via more natural methods and a move away from single crop farming is included. The image and the public perception of chemists and chemistry is an evolving entity. Directly and indirectly, Rachel Carson was instrumental in promoting Green Chemistry Practices and Environmental Chemistry. Her interdisciplinary contributions as a scientist, author, and humanitarian make her an excellent candidate for the Nobel Prize.

HIST 26 - Vive le francium: Marguerite Perey, discoverer of the last natural element

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Several Nobel Prizes were awarded for discoveries in radioactivity, perhaps the most well-known was the Nobel Prize in Physics awarded in 1903 to Antoine Henri Becquerel "in recognition of the extraordinary services he has rendered by his discovery of spontaneous radioactivity", the other half jointly to Pierre Curie and Marie Curie, née Sklodowska "in recognition of the extraordinary services they have rendered by their joint researches on the radiation phenomena discovered by Professor Henri Becquerel." Marie Curie went on to receive a second Nobel Prize, this time in chemistry, in 1911 for her discovery of the elements radium and polonium, which would have also been shared with her husband had he not been killed in an accident crossing the street in 1906.

Well after Marie Curie received both Nobel Prizes and had come to be known as Our Lady of Radium, Marguerite Perey, then age 19, interviewed and was hired to be Marie Curie's personal technician and was given the task of isolating actinium from uranium ore. After Curie's death in 1934, Perey stayed on in the lab working under Andre Debierne and Irene Joliot-Curie, Marie Curie's daughter, who also received a Nobel Prize in Chemistry in 1935 with her husband Frederic Joliot, "in recognition of their synthesis of new radioactive elements." In 1939, Perey noticed the actinium she purified emitted unexpected radiation and proved that this radiation was new, that she had discovered a new element, which she named francium, after her country.

Like her mentor, Perey had high hopes for her discovery, that it would be used for the early diagnosis of cancer. Tragically, just like the short-lived element she discovered that only exists in the amount of an ounce at any one time on the earth, the years she would have spent researching francium were cut short as she succumbed to a gruesome bone cancer at age 65.

Marguerite Perey was the first woman to be elected to the French Academy of Sciences in 1962, an honor denied Marie Curie and her daughter, and was nominated for the Nobel Prize in 1952, 1958, and 1961, but never received the Prize. The 1961 nomination reads, "…Mrs. Marguerite Perey (who is nominated) for her discovery of element 87, name francium, is in fact seriously ill, a victim (of exposure) to radioactivity. To recognize her contribution would be a universal act of humanity and a Christian act of charity."

HIST 27 - Rosalind Franklin: Her pathway to DNA

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Her early untimely death eliminated the issue of whether to include her in the 1962 Nobel Prize Award winners with Watson, Crick and Wilkins and how this could be accomplished. This presentation will focus on her other work and how it was related to her DNA work. Like many women of her time, her father initially discouraged her from a scientific career. Due to WWII, she began working on coal and did pioneering research on the structure of coal. Following WWII she undertook a research program in France and conducted pioneering research on the formation of charcoal, defining two pathways for its formation. In France she became proficient in the use of X-ray instrumentation and the mathematical analysis of the data generated to develop structural information to define the material. Her work during these early years of her career provided the background to attack the structure of DNA that she is well known for and the debate of her influence in reaching the final structure that led to the Nobel Prize.

HIST 28 - Professor Emerita Darleane C. Hoffman

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Professor Darleane Hoffman is one of our most illustrious radiochemists of the 21st Century. Her career spans decades of research in radiochemistry, including rapid chemical separation of short-lived fission products, searching for heavy elements in nature and finding traces of primordial plutonium 244 in natural ores. One significant contribution was her atom-at-a-time studies of chemical and nuclear properties of the heaviest elements, including the first chemical studies of elements 106 (seaborgium) through 108 (hassium).

After graduating from Iowa State University with her Ph.D. in 1951, Hoffman started her career at Oak Ridge National Laboratory but shortly moved to Los Alamos Scientific Laboratory where she remained until 1984. In 1979, she became the first women division leader of a technical division, the Chemistry and Nuclear Chemistry Division. In 1984 she became Professor of Chemistry at the University of California, Berkeley and leader of the Heavy Element and Nuclear and Radiochemistry Group. In 1991 she cofounded the Seaborg Institute of Transactinium Science at Lawrence Livermore National Laboratory.

Hoffman has received many awards, including the ACS award for Nuclear Chemistry in 1983, the first woman to be so honored. In 1997 she received the National Medal of Science and, in 2000, the ACS Priestley award. This was followed by the Hevesy Medal Award in 2010. As well as serving on many national committees, she has been active in promoting the field of chemistry for women.

This presentation will discuss many of Professor Hoffman's contributions.

HIST 29 - Always a nominee, never a Nobelist

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Between 1901 and 2016, four women have won the Nobel Prize in Chemistry: Ada E. Yonath (2009), Dorothy Crowfoot Hodgkin (1964), Irène Joliot-Curie (1935), and Marie Cure (1911). The Nobel Prize website (https://www.nobelprize.org/) has a Nomination Archive database, "data until 1963 is included for nominations to all Nobel Prizes except the Nobel Prize in Physiology or Medicine, that only contains data until 1953. Note also that names of the nominees and other information about the nominations cannot be revealed until 50 years later." The Archive allows you to search by gender and prize. If you carry out a search for all women nominated for the Nobel Prize in Chemistry between 1901 and 1965, a list of twelve women is generated: three won the Nobel Prize in Chemistry (see above); one, Maria Goeppert-Mayer, won the Nobel Prize in Physics; and one, Marie Curie, won the Nobel Prize in Chemistry (1911) and the Nobel Prize in Physics (1903). Four of those nominated who did not win (Ida Noddack, Marguerite Perey, Marietta Blau and Lise Meitner) will be discussed in separate presentations in this symposium. I will give a short introduction to the work of four others who were nominated but did not win: Dorothy Wrinch (nominated twice), Joan Folkes (nominated once), Martha Chase (nominated once), and Thérèse Tréfouël (nominated once).