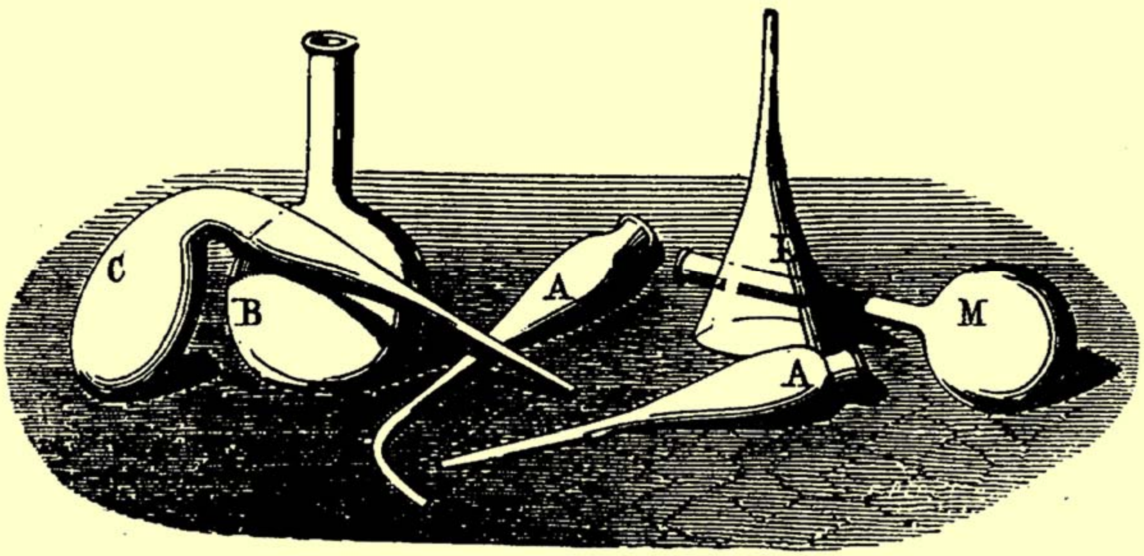
American Chemical Society

DIVISION OF THE HISTORY OF CHEMISTRY



PROGRAM AND ABSTRACTS

248th ACS National Meeting
San Francisco, CA
August 10-14, 2014

S. C. Rasmussen, Program Chair

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Final Program

HIST

DIVISION OF THE HISTORY OF CHEMISTRY

S. C. Rasmussen, *Program Chair*

SUNDAY MORNING

Section A

InterContinental San Francisco - Twin Peaks

HIST Tutorial and General Papers

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

8:30 1. HIST Tutorial: Impact of World War I on chemistry, physics, and astronomy. **V. Trimble**

9:10 2. J.W. Baker's pioneering undergraduate course in physical organic chemistry. **M. D. Saltzman**

9:40 3. "Charles Hampton, Research Chemist": Did this book attract young adults to careers in chemistry? **E. T. Strom**

10:10 Intermission.

10:25 4. Accuracy of dates in chemical historiography: the curious case of the 19th-century French chemist Auguste Laurent – a clarification. **J. Gal**

10:55 5. Rise, fall, and fine print of Erlenmeyer's Rule. **R. Hudson**

11:25 6. Polypyrrole: The first conducting organic polymer. **S. C. Rasmussen**

SUNDAY AFTERNOON

Section A

InterContinental San Francisco - Twin Peaks

Symposium on the HIST Citation for Chemical Breakthrough Award Program

J. Seeman, *Organizer, Presiding*

1:00 Introductory Remarks.

1:10 7. History of HIST Awards. **G. D. Patterson**

1:40 8. Past, present and future of the Citation for Chemical Breakthrough Award program. **J. I. Seeman**

2:10 9. Citation for Chemical Breakthrough (CCB) awards, 2012: Choosing Louis Pasteur's award-winning publication. **J. Gal**

2:40 10. Isotopes: Identifying the breakthrough publication. **C. J. Giunta**

3:10 Intermission.

3:25 11. Russian or German? First or fourth? The Citation for Chemical Breakthroughs award to St. Petersburg State University for Mendeleev's periodic system of the elements. **D. E. Lewis**

3:55 12. Charles M. Hall's patent for refining aluminum metal by electrolysis. **N. C. Craig**

4:25 13. Gomberg, Schlenk, and Free Radicals: An Unknown Discovery and Belated Breakthrough. **T. T. Tidwell**

SUNDAY EVENING

InterContinental San Francisco - Russian Hill

5:00 - 8:00 HIST Executive Committee Meeting

MONDAY MORNING

Section A

InterContinental San Francisco - Grand Ballroom C

8:00 - 8:30 HIST Business Meeting

Found and Lost: Incredible Tales of Spurious, Erroneous and Rehabilitated Elements

Cosponsored by INOR

M. Fontani, *Organizer*
M. Orna, *Organizer, Presiding*

8:30 14. Found and lost: Incredible tales of spurious, erroneous and rehabilitated elements, an overview. **M. Orna**

8:45 15. Florentium: The metal of the Florentines. **M. Fontani**, M. Costa

9:05 16. Charles James: His efforts to identify element #61. **A. Greenberg**

9:25 17. B Smith Hopkins and the Discovery of "Illinium," Element 61. **V. V. Mainz**, G. S. Girolami

9:45 18. Legend of vestium. **J. L. Marshall**, V. R. Marshall

10:15 Intermission.

10:30 19. Vexed story of element 72 - hafnium. **E. Scerri**

11:00 20. Disappearing spoon: Ghost elements. **S. Kean**

The Role of the Chemical Technician through the Decades

Sponsored by I&EC, Cosponsored by CTA and HIST

MONDAY AFTERNOON

Section A

InterContinental San Francisco - Grand Ballroom C

Found and Lost: Incredible Tales of Spurious, Erroneous and Rehabilitated Elements

Cosponsored by INOR

M. Orna, *Organizer*
M. Fontani, *Organizer, Presiding*

1:15 Introductory Remarks.

1:20 21. Emanations and isotopes. **C. J. Giunta**

1:45 22. Discoveries of real and imaginary elements by astronomical methods. **V. Trimble**

2:10 23. Undiscovery of erythronium. **J. L. Marshall**, V. R. Marshall

2:35 24. Controversy of Lucium- the first patented "element". **K. K. Walker**, B. D. Kaissi

3:00 Intermission.

3:15 25. Twilight of the naturally occurring elements: Moldavium, sequanium, and dor. **M. Fontani**

3:45 26. Found, lost and found again? The story of element 43. **B. Van Tiggelen**

4:10 27. Even ACS Presidents announced the discovery of new elements and were wrong. **J. M. Hayes**, P. L. Perez

4:35 28. A philatelic tribute to elements found and lost. **D. Rabinovich**

MONDAY EVENING

Section A

InterContinental San Francisco - Telegraph Hill

5:15 - 6:30 ***Lost Elements* Reception**

Moscone Center, North Bldg. - Hall D

Sci-Mix

S. C. Rasmussen, *Organizer*

8:00 - 10:00

17, 21. See previous listings.

46. See subsequent listings.

TUESDAY MORNING

Section A

Moscone West - Room 3002

Science and Legacy of Attila Pavlath

J. Hayes, *Organizer, Presiding*

8:00 Introductory Remarks.

8:10 29. Dr. Attila Pavlath and the California Section of the American Chemical Society. **P. F. Vartanian**

8:40 30. Promoting public image for chemistry: Attila Pavlath's contribution to ACS's international recognition. **F. Darvas**

9:10 31. Survivors' tales: ACS staff recollections of a super active president. **F. E. Walworth**

9:40 Intermission.

9:55 32. Brief summary of Dr. Attila Pavlath at the USDA Western Regional Research Laboratory. **J. W. Finley**

10:25 33. Attila Pavlath: Leader, Mentor, Scientist and Friend. **E. A. Nalley**

10:55 34. Always a pioneer: sic itur ad astra! **G. A. Pavlath**

11:25 35. Reflections on my life. **A. E. Pavlath**

Women Leaders of the Global Chemistry Enterprise

Sponsored by WCC, Cosponsored by HIST, IAC, PRES, and PROF

TUESDAY AFTERNOON

Section A

InterContinental San Francisco - Twin Peaks

HIST Award Symposium Honoring Ernst Homburg

P. Morris, *Organizer*
G. Patterson, *Organizer, Presiding*

1:00 Introductory Remarks.

1:05 36. The chemist and the laboratory. **P. Morris**

1:35 37. Women chemists in 18th century France, with an emphasis on Madame d'Arconville. **B. van Tiggelen**

2:05 38. 'Science versus practice' and the German chemist ca. 1860: Erlenmeyer in context. **A. Rocke**

2:35 39. Identities in the twentieth century. **C. Reinhardt**

3:05 Intermission.

3:20 40. Chemists in American industry between the world wars. **J. K. Smith**

3:50 41. Patents, powders, profits: the significance of the patent infringement trial, Nobel's Explosives Co. v. Anderson (1894). **S. Mauskopf**

4:20 42. Chemists and chemical societies, 1500-1900. **E. Homburg**

5:20 Concluding Remarks.

Women Leaders of the Global Chemistry Enterprise

Sponsored by WCC, Cosponsored by HIST, IAC, PRES, and PROF

TUESDAY EVENING

7:00 - 9:00 **2014 HIST Award Banquet** - Far East Cafe - 631 Grant Avenue, San Francisco, CA 94108

[*Tickets may be purchased from Vera Mainz, HIST Secretary-Treasurer*]

WEDNESDAY MORNING

Section A

InterContinental San Francisco - Twin Peaks

General Papers

S. C. Rasmussen, *Organizer, Presiding*

8:30 43. New approaches to exploring the history of chemistry through the visual arts. **D. B. Cordes**

9:00 44. Alchemy in India. **S. Saha, B. B. Saha**

9:30 45. Near Neighbors: sulfuric acid producers and petroleum refineries in 19th century New York City. **P. Spellane**

10:00 Intermission.

10:15 46. Modern chemical warfare: history, chemistry, morality – a recollection and reflection at the centenary of World War I. **J. Gal**

10:45 47. ORGN's website: A resource for the study of the history of chemistry and an inspiration to study the history of chemistry. **B. J. Myers**, E. E. Fenlon

11:15 48. History and Development of the Reaction Mechanisms Conference. **E. E. Fenlon**, B. J. Myers, T. T. Tidwell

What Does 20th Century Physical Chemistry Have To Say To 21st Century Physical Chemists?

Sponsored by PHYS, Cosponsored by HIST

WEDNESDAY MORNING

Section A

The IUPAC Solubility Data Series: 100 Volumes of Solubility Data Online

Sponsored by CINF, Cosponsored by ANYL and HIST

What Does 20th Century Physical Chemistry Have To Say To 21st Century Physical Chemists?

Sponsored by PHYS, Cosponsored by HIST

HIST 1 - HIST Tutorial: Impact of World War I on chemistry, physics, and astronomy

Virginia Trimble, *vtrimble@astro.umd.edu. Department of Physics & Astronomy, University of California, Irvine & LCOGT, Irvine, CA 92697, United States*

A World War II has been called "The Physicists' War," meaning radar, rockets, and atomic bombs. WWI was, somewhat similarly, "The chemists' war," and we meet nearly on the centenary of the Guns of August. Sadly, perhaps, most people will think first of poison gases, and indeed Fritz Haber was the one German scientist whom Lord Rutherford never forgave and never spoke to again. But they caused less than 1% of the deaths, and other chemistry was probably more important. Both sides had to learn to fix nitrogen, for fertilizers as well as for explosives, to replace guano shipped from South America. The Brits and other allies were used to relying on German dyestuffs and optical glass, while the Germans had to replace most of the petroleum they had been importing. Large scale production of synthetic rubber, anti-microbials, and other products of the chemists' art also received major boots. And, like the bomb, it was not possible for humanity to forget how to make all these once they had learned how. I will also say something about the Great War's effects on physics and astronomy. Whether WWIII will be the biologists' war or the information technologists' war is not clear, though we all surely hope not in the lifetimes of anyone here.

HIST 2 - J.W. Baker's pioneering undergraduate course in physical organic chemistry

Martin D Saltzman, *msaltzmn@providence.edu. Department of Chemistry, Providence College, Providence, RI 02918, United States*

John William Baker (1898-1967) was one of a group of pioneering physical organic chemist in Great Britain who laid the ground work for the great strides that were in the post-World War II era in this discipline. A student of J. T. Thorpe and C. K. Ingold at Imperial College, he received his Ph.D. in 1925. When Ingold became Professor of Organic Chemistry at Leeds University, Baker was one of the first persons he added to the staff. Ingold had the intention of reforming the way in which organic chemistry was taught to undergraduates. Instead of rote memorization Ingold sought to take a mechanistic approach. Baker was an enthusiastic follower of Ingold's approach and when Ingold left Leeds to take up the professorship at University College, London Baker continued what Ingold had started and elaborated upon it. This paper will examine a course given by Baker in the 1941-42 academic year to third year chemistry students. These notes were taken by Donald Vincent a student in the course and are now in the archives of Leeds University. After reviewing the contents of the course from the notes, I will try to show how this course was an anticipation of Ingold's Structure and Mechanism in Organic Chemistry which was first published in 1951.

HIST 3 - *Charles Hampton, Research Chemist*: Did this book attract young adults to careers in chemistry?

E Thomas Strom, *tomstrom@juno.com. Department of Chemistry and Biochemistry, University of Texas at Arlington, Arlington, TX 76019-0065, United States*

In 1942 Dodd and Mead published the book "Charles Hampton, Research Chemist" by Arthur W. Kenney and Stephen C. Kenney. This book was part of the series of Dodd Mead Career Books written for young adults. This book on a research chemist was one of a very few dealing with scientific careers. This novel will be evaluated from the perspective of whether it gave a realistic view of an industrial chemistry career.

HIST 4 - Accuracy of dates in chemical historiography: The curious case of the 19th-century French chemist, Auguste Laurent, a clarification

Joseph Gal, *joe.gal@ucdenver.edu. Department of Medicine and Department of Pathology, University of Colorado School of Medicine, Aurora, Colorado 80045, United States*

In historiography, accuracy in dates is essential, yet, as the literature shows, inaccurate dates are common, for several reasons. A particularly problematic example concerns Augustin ("Auguste") Laurent, one of the most important chemists of the 19th century. Different dates for his birth have persisted in the literature since the 1890s.

Many sources give 1807 or specifically November 14th, 1807, for his birth, e.g., Wurtz in 1862; Tiffeneau, 1918; Jacques, 1953; Kapoor (DSB), 1973; Fournier, 2009; etc. However, many other sources give 1808 or specifically September 14th, 1808, e.g., French chemist/historian Édouard Grimaux, 1896; Leicester, 1956; Partington (A History of Chemistry), 1964; Brock (Norton History of Chemistry), 1992; Bensaude-Vincent, 2003; etc. Indeed, eminent historians of chemistry appear on either side of the 1807/1808 conflict. Moreover, some have given one of the dates at one time and the other at another time. For Laurent's death in 1853, April 5th (Grimal, 1958), 15th (many sources), and 23rd (Grimaux, 1896; Findlay, 1937; others) have been claimed. To resolve the discrepancies, archival sources were examined. Laurent's birth certificate (Archives Départe-mentales, Haute-Marne) indicates November 14th, 1807, for birthdate; his death certificate [Archives numéri-sées de Paris, État civil reconstitué (XVIe siècle - 1859)] provides April 15th, 1853, for his death. These ar-chival dates agree with declarations by Laurent's widow Francine (née Schrobilgen, 1820-1914), son Hermann (a noted mathematician, 1841-1908), and Jérôme Nicklès (1821-1869), a chemist friend who was at Laurent's side to the end. Conclusion: Auguste Laurent was born November 14th, 1807, and died April 15th, 1853.

HIST 5 - Rise, fall, and fine print of Erlenmeyer's rule

***Reggie Hudson**, reggie.hudson@nasa.gov. Astrochemistry Laboratory, NASA Goddard Space Flight Center, United States*

The name of Emil Erlenmeyer (1825 - 1909) is synonymous with the flask that he invented, but it also appears to have been Erlenmeyer who first noted that aldehydes are made readily by the hydration of alkynes. In the United States, this reaction was part of the PhD research of Julius Nieuwland (1878 - 1936) at the Catholic University of America, before Nieuwland began his long scientific career at Notre Dame. Both investigators concluded that the result of alkyne hydration is not the expected alcohol, but rather the isomeric aldehyde, a conclusion termed Erlenmeyer's rule. This presentation will focus on the prototypical Erlenmeyer-Nieuwland product, the elusive vinyl alcohol, $H_2C{=}CH(OH)$. The author's research has played a role in the modification of Erlenmeyer's rule, and has helped to confirm a prediction of the young Julius Nieuwland.

HIST 6 - Polypyrrole: The first conducting organic polymer

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

The discovery that the conductivity of conjugated organic polymers can be controlled via redox processes has led to materials that combine the electronic properties of inorganic semiconductors with the weight and density of plastics. As such, these materials have been studied extensively and their importance recognized with the awarding of the 2000 Nobel Prize in chemistry to Alan Heeger, Alan MacDiarmid, and Hideki Shirakawa. This award stemmed from their work on conducting polyacetylene via doping with oxidants, which they carried out in the late 1970s. While these studies produced the most dramatic results, investigations of conjugated polymeric materials date back to the early 1960s, with the first organic polymer of significant conductivity being polypyrrole as reported by Donald Weiss and coworkers in Australia. The development of polypyrrole materials will be presented beginning with the first report of pyrrole's polymerization in 1922 through the more well-known work of Diaz and coworkers in 1979.

HIST 7 - History of HIST Awards

***Gary D Patterson**, gp9a@andrew.cmu.edu. Department ofr Chemistry, Carnegie Mellon University, Pittsburgh, PA 15213, United States*

Every voluntary human organization eventually reaches the point where there is a desire to honor certain of its members. HIST was conceived as an interest group by Edgar Fahs Smith and Charles Brown, but it was the work of Lyman Newell that raised it to the status of a Division of the American Chemical Society in 1926. While many fine Chairmen served the Division, it was the Secretary-Treasurers that provided continuity. One of the most notable Secretaries(1948-1965) was Sidney M. Edelstein, the founder and President of the Dexter Chemical Company. He provided both vision and money to support an award for “Outstanding Achievement in the History of Chemistry” and named it the “Dexter Award.” When Edelstein died(1994), the financial future of the Award was uncertain, and in 2002 the funding source changed and the Award was named for Sidney M. Edelstein. Eventually, this temporary arrangement failed and the Award went into lapse. It has now been restored as the HIST Award for Outstanding Achievement in the History of Chemistry(2012-). Once many articles had been published in the

Bulletin for the History of Chemistry, the desire to celebrate the best articles grew. The Best Paper Award was started by the editor William Jensen in 1989. James J. Bohning was the first winner. Eventually the vision of HIST included all world chemistry. Jeffrey Seeman proposed that HIST sponsor an award that recognized seminal papers in the history of chemistry, the HIST Citation for Chemical Breakthrough Award. He will discuss this program in detail following.

HIST 8 - Past, present, and future of the Citation for Chemical Breakthrough Award program

***Jeffrey I. Seeman**, jseeman@richmond.edu. Department of Chemistry, University of Richmond, Richmond, Virginia 23173, United States*

The Citation for Chemical Breakthrough Award were first presented in 2006. As of 2013, 40 awards have been issued around the world. A summary of the program will be given, including spectacular highlights as well as unforseen challenges. A view to the future of the program will also be presented.

HIST 9 - Citation for Chemical Breakthrough (CCB) awards, 2012: Choosing Louis Pasteur's award-winning publication

***Joseph Gal**, joe.gal@ucdenver.edu. Department of Medicine and Department of Pathology, University of Colorado School of Medicine, Aurora, Colorado 80045, United States*

A CCB award for 2012 was made by the Division of the History of Chemistry to the École normale supérieure (ENS), a prestigious university-level institution in Paris where Pasteur discovered molecular chirality in 1848. The award requires choosing the most relevant publication by the discoverer, and in Pasteur's case three articles were contenders: his brief first announcement of the discovery in May 1848 to the French Academy of Sciences; his full paper on the work, also published in 1848; and the 1861 publication of his famous two lectures to the Chemical Society of Paris in 1860 on the discovery. The choice was difficult since each of the three publications has unique elements and strengths. Thus, the May 1848 article had the merit of being first; it is concise and not burdened with specialized experimental and theoretical details and was therefore widely comprehensible. The full paper in 1848 on the other hand had the merit of providing the scientific and experimental details needed for the full description and appreciation of the discovery. The lectures of 1860 stand as a sweeping and grand narrative of the discovery, including its background and its broader implications for chemistry and biology. Taking all of these considerations into account, the decision was reached that Pasteur's May 1848 paper best meets the CCB criteria for the winning publication. It was a stunning first and succinct announcement of a hitherto-unheard-of but clearly vital phenomenon with far-reaching implications. The award ceremony was held at the ENS in October 2013.

HIST 10 - Isotopes: Identifying the breakthrough publication

***Carmen J Giunta**, giunta@lemoyne.edu. Department of Chemistry and Physics, Le Moyne College, Syracuse, NY 13214, United States*

Selection of the isotope concept for a Citation for Chemical Breakthrough award in 2013 presented both the dilemma of selecting the most appropriate publication to honor and the opportunity for reflection on the nature of this discovery and of scientific discovery more generally. Several findings in the early years of the twentieth centuries led Frederick Soddy to introduce the term isotope (a word suggested by classics scholar Margaret Todd) for varieties of the same element that have different atomic masses. The public birthday of the term is well established: it was first published in the Dec. 4, 1913, issue of Nature. The public debut of the concept, however, is much more difficult to date. Plausible candidates will be reviewed, from the recognition of distinct but chemically inseparable "radioelements," to the elucidation of the pathways of radioactive decay collectively organized under the law of radioactive displacement, to the adoption of atomic number rather than atomic weight as the organizing principle of the periodic table.

HIST 11 - Russian or German? First or fourth? The Citation for Chemical Breakthroughs award to St. Petersburg State University for Mendeleev's periodic system of the elements

***David E. Lewis**, lewisd@uwec.edu. Department of Chemistry, University of Wisconsin-Eau Claire, Eau Claire, WI 54702-4004, United States*

Mendeleev's periodic system of the elements first appeared in Russian, in his book, Osnovy khimii [Elements of Chemistry], published in February, 1869, and it was immediately abstracted into German in the Zeitschrift für Chemie. It also appeared in two papers (1869, 1870) in the Zhurnal Russkago Fiziko-Khimicheskago Obshchestva, and finally, as the German translation of the 1870 Zhurnal paper in Liebigs Annalen der Chemie. The process of deciding which of these competing candidates should be recognized as the breakthrough paper will be discussed, and a brief account of the presentation ceremony at St. Petersburg State University on October 31, 2013, will be given.

HIST 12 - Charles M. Hall's patent for refining aluminum metal by electrolysis

***Norman C Craig**, norm.craig@oberlin.edu. Department of Chemistry and Biochemistry, Oberlin College, Oberlin, OH 44074, United States*

On a single day, April 2, 1889, Charles M. Hall was awarded five patents for his discovery of the electrolysis process for extracting aluminum metal from aluminum oxide. To honor and celebrate Hall's breakthrough discovery under the CCB program of the Division of the History of Chemistry, it was necessary to identify which of the patents disclosed the breakthrough method. All five patents were carefully reviewed, as were the circumstances of the applications for the patents. As part of this evaluation, the question of why so many patents arose. Was more at stake than an inventor attempting to make the patent claims as broad as possible? The evi-dence reveals that problems with the original process on the small scale propelled Hall's determined investi-gation of alternative formulations of electrolyte baths and of different cell designs. Based on this analysis, one of the five patents was signaled out and was honored by the CCB award.

HIST 13 - Gomberg, Schlenk, and free radicals: An unknown discovery and belated breakthrough

***Thomas T. Tidwell**, ttidwell@chem.utoronto.ca. Department of Chemistry, University of Toronto, Toronto, Ontario M5S 3H6, Canada*

Moses Gomberg is widely and correctly acclaimed for his breakthrough discovery of the triphenylmethyl radical, although this was originally the object of dispute until validation by Schlenk's synthesis of an isolable triarylmethyl radical in 1910. These discoveries however were not recognized by the award of the Nobel Prize to Gomberg and Schlenk, for reasons documented by the late Lennart Eberson as due to confused policies and prejudice on the part of the Nobel Committee. Overlooked in this debate was an earlier clear and correct report of the discovery free radicals from 1879, unknown to historians of chemistry until 2013 (Nature Chem. 2013, 637).

HIST 14 - Found and lost: Incredible tales of spurious, erroneous, and rehabilitated elements, an overview

***Mary Virginia Orna**, maryvirginiaorna@gmail.com. Department of Chemistry, The College of New Rochelle, New Rochelle, New York 10805, United States*

At last count, there are historically many more elements that never made it into the Periodic Table than those that did. The concept of “element” evolved over the centuries, eventually allowing chemists to distinguish simple bodies from compounds on a theoretical basis. Eventually, launched by Bunsen and Kirchhoff's work, identify-ing new elements by spectroscopy was all the rage, and it was easy to “discover” a new element because new lines, or a new combination of lines, appeared everywhere in the spectrum (and gave particularly novel “pat-terns” in mixtures of already known elements). Three major developments gave rise, in their turn, to a resolution of the false discoveries that dogged the footsteps of chemists even into the mid-20th century: the periodic table, atomic number, and the discovery of isotopes. The first was an organizational tool that allowed chemists to realize for the first time that elements had their “place;” the second placed a limit on the number of elements based on the number of nuclear protons; the third resolved the puzzle over new elements in radioactive decay products. This symposium will take a close look at some erroneous discoveries, the lessons to be learned, and how they were resolved based upon new knowledge.

HIST 15 - Florentium: The metal of the Florentines

***Marco Fontani**, marco.fontani@unifi.it, Mariagrazia Costa. Department of Chemistry, University of Florence, Florence, Tuscany 50134, Italy*

Even up to the end of the 1920s , the name “salts of commercial didymium” was used to indicate the mixture of the elements of the rare earths that, after a crude removal of cerium were present in monazite sands. It was precisely by starting with these “didymium earths” that Luigi Rolla (1882-1960) and Lorenzo Fernandes (1902-1977), in 1922, undertook an immense investigation in a search directed at the isolation of element 61, which they dubbed florentium. Despite the heroic and dramatic efforts on their part to isolate this elusive element, including about 52,000 fractional crystallizations alone on tons of commercial didymium, the little florentium they thought they had found was subsequently discredited. Element 61, with isotopic half-lives considerably shorter than the age of the earth, was not present in rare-earth minerals in any detectable amount.

HIST 16 - Charles James: His efforts to identify element #61

***Arthur Greenberg**, art.greenberg@unh.edu. Department of Chemistry, University of New Hampshire, Durham, New Hampshire 03824, United States*

Charles James (b. England, 1880) studied chemistry at the University of London with William Ramsay (Nobel Prize in Chemistry, 1904), who would remain his inspiration and friend. He arrived in the United States in 1906 accepting a position with the National Refining Company in West Chester, PA. However, he was almost immediately recruited by Charles Parsons to the New Hampshire College of Agriculture and Mechanical Arts in Durham, N.H. (in 1923 the University of New Hampshire). James's research in Durham was focused on the rare earths and he was a contributor to the discovery of lutetium. In 1912, The gap in atomic weights had Ramsay suggesting to James that there was a missing element between neodymium and samarium. Following the discovery of atomic numbers by Henry Moseley in 1913, in the 1920s the search for element #61 gained momentum. As it turned out, James was "scooped" by B. Smith Hopkins, at the University of Illinois who named the "new element" ilium. However, it was only in 1947 that definitive proof of element #61, promethium, a radioactive by-product of the explosion of the atomic bomb, was published. The present talk will describe aspects of James's studies dedicated to the discovery of element #61.

HIST 17 - B. Smith Hopkins and the discovery of "illinium", Element 61

***Vera V Mainz**, mainz@illinois.edu, Gregory S Girolami. Department of Chemistry, University of Illinois at Urbana-Champaign, Urbana, IL 61802, United States*

Born in Owosso, Mich., Hopkins began teaching in the Menominee, Mich., public schools in 1897. He received a Ph.D. in 1906 with H. N. Morse at Johns Hopkins University and then held various academic posts before joining the Illinois faculty in 1912. At Illinois, Hopkins worked with Charles Balke, who was conducting a series of researches on beryllium, yttrium, columbium (now called niobium), tantalum, and the rare earths. When Balke left Illinois in 1916, Hopkins carried on this research, specializing more and more in the chemistry of the rare earths. This was the field in which he made his greatest contributions to chemistry.

At that time, separating rare earths from each other was a long and tedious process, depending on repeated recrystallizations of the double magnesium nitrates, the bromates, and other salts. In some cases, thousands of recrystallizations were necessary. In 1926, Hopkins with Leonard Yntema and J. Allen Harris announced the discovery of the long sought element 61, which they named “illinium.” Repeated attempts failed to concentrate this element any further, and with the development of fission reaction, it was determined that element 61 (now known as promethium) was highly radioactive. Most chemists concluded that it did not exist in nature. Hopkins had considered the discovery of illinium the climax of his career, and was bitterly disappointed that his work was not accepted. But his contributions to rare earth chemistry were significant and laid the groundwork for much subsequent research.

HIST 18 - Legend of vestium

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The history of the putative element "vestium," which was described by the Polish scientist Jedrzej Sniadecki in 1808, is reviewed. Over a century later, some have claimed vestium was actually ruthenium; therefore, the discovery of ruthenium should be credited to Sniadecki rather than to Karl Ernst Klaus, the historically accepted discoverer in 1844. To evaluate this claim, the authors have repeated the chemistry in the laboratory, showing that it is impossible that vestium is ruthenium. In this presentation, photographs of the laboratory experimental results are included, which suggest strongly that Sniadecki's vestium was the uncomplexed chloride of palladium.

HIST 19 - Vexed story of element 72 - hafnium

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The history of the discovery of element 72 that was eventually named hafnium provides perhaps the single most bitterly fought controversy among the discovery of any element. One of the first reports of its discovery was by Georges Urbain from France who eventually took what he believed to be a sample of this element to Henry Moseley in the hope that his claim might be validated. It did not take long for Moseley to show that Urbain's new element was spurious. About ten years later Hevesy and Coster working in the Neils Bohr Institute in Copenhagen announced that they had discovered the real element 72. At this point Urbain revived his claim and was supported by the British and French press, both scientific and popular. What followed can only be described as a comical priority dispute driven entirely by nationalism. The British did not hide the fact that they supported the French claim of Urbain because the British and the French had been allies during the Great War. Another controversial aspect of this element was the extent to which it's discovery was helped by Bohr's quantum mechanical account of the structure of atoms. The popular account has it that Bohr directed Hevesy and Coster to look for the new element in some minerals containing zirconium. Subsequent historical research has shown that this view is untenable.

HIST 20 - Disappearing spoon: Ghost elements

***Sam Kean**, samkean@gmail.com. Unaffiliated, Washington, D.C. 20009, United States*

How did the simple naming of elements turn into an international incident during the Cold War? Why did technetium get discovered more times than any other element? How has fraud shaped the periodic table? And what three other states (besides California!) very nearly had elements named after them? Some of us had to memorize the periodic table when young, and many of the rest of us know large swaths of it by heart today. But that's only the official table. What about the "lost elements," the ones that didn't quite make it? This talk, based on Sam Kean's The Disappearing Spoon - his bestselling book about the hidden stories buried all over the periodic table - explores the woulda, coulda, shoulda of every chemist's favorite chart. Come hear about all the wild elements names, big egos, and heated battles that (almost) made the table what it is today.

HIST 21 - Emanations and isotopes

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The discovery of radioactivity in 1896 and the ability to detect its ionizing radiation led to an explosion of discoveries of "radioelements" in the final years of the nineteenth century and the first years of the twentieth. Some of these new elements, like radium and polonium, are still to be found on the periodic table. Others, however, are absent or at least hidden. Many of these latter were true discoveries, but not of distinct elements. Rather, we understand them today as isotopes. For example, the three radioactive "emanations" discovered at this time, thorium emanation, radium emanation, and actinium emanation, we now recognize as three isotopes of the element radon. This presentation will describe the discoveries of several radioelements, including the emanations. It will also briefly describe how various groups of these radioelements came to be recognized as varieties of the same element, thereby occupying the same place in the periodic table.

HIST 22 - Discoveries of real and imaginary elements by astronomical methods

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Helium? Yes, in 1868, by Norman Lockyer, who spotted a yellow line not due to sodium in the spectrum of solar prominences, which he and Pierre Janssen had learned to observe without the need of an eclipse. Acceptance by the chemical community came only after laboratory confirmation by William Ramsay. Technetium? The first natural sample was recognized in 1952 by Paul Merrill in the spectra of a few cool stars. Charles A. Young and William Harkness thought they had identified an element in the solar corona following the 1869 solar eclipse: they dubbed it coronium. Only in 1942 did Bengt Edlén show that this 5303 Å feature came from iron atoms deprived of 13 electrons. The corona is hot, though chemically normal. Nebulium? The Oxford English Dictionary credits the word to William Crookes, who was a chemist and should have known better, in his 1898 address to the British Association for the Advancement of Science, though the strongest line had actually been seen by William Huggins in the Orion nebula long before. Lockyer thought Mg was to blame. The right answer came in 1928 from physicist Ira Bowen (later director of the Mount Wilson and Palomar Observatories). Twice-ionized oxygen is responsible for the strongest emission lines (O and N for others), the very low density of interstellar gas permitting forbidden radiative decays from levels that would be depopulated by collisions in terrestrial samples. Shorter-lived were asterium, aldebaranium, and others. And the less said about whether potassium flares smoke, the better!

HIST 23 - Undiscovery of erythronium

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Don Andrès Manuel del Río in 1801 claimed he discovered a new element from the mines of Zimapán, Mexico, which he named "erythronium." Four years later, this claim was investigated in Paris by Hippolyte Victor Collet-Descotils, who identified the "new element" as chromium, which had been discovered earlier (1797) by Nicolas-Louis Vauquelin. In 1831 Nils Sefström in Sweden discovered vanadium, which was soon recognized as del Río's erythronium. The authors have returned to the laboratory to repeat the experiments of Descotils in an attempt to determine whether or not his "undiscovery" of erythronium was justified. Photographs of these laboratory studies are included in the presentation.

HIST 24 - Controversy of lucium - the first patented "element"

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Lucium, the first patented element, was first reported by Prosper Barrière in March of 1895. After news of the discovery was published by Sir William Crookes in Chemical News in 1896, controversy ensued: prominent scientists were incorrectly linked with experiments performed to verify the presence of the new element in the article published by Crookes, and ultimately the “element” lucium was proven not to be a new element at all by July of 1897. It was determined that lucium, instead of being a new element, was in fact an impure sample of yttrium.

HIST 25 - Twilight of the naturally occurring elements: Moldavium, sequanium, and dor

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The more the vacant boxes in the periodic table diminished, the more scientists increased their efforts in the attempt to identify the elements still missing; the techniques used became more and more sophisticated, but the elements seemed more elusive and difficult to find. Despite the risk of reporting false discoveries, the number of announcements increased and scientific journals received many papers that endowed many fanciful names on elements 85, 87 and 93. In Paris two spectroscopists were looking for the presence, in nature, of these 3 elements. Yvette Cauchois (1908-1999) - who created a curved crystal focusing X-ray spectrograph, a highly sensitive, high-resolution instrument - with the aid of her colleague, Romanian Horia Hulubei (1896-1972), reported a doublet of weak X-ray lines which they assumed were element 87. In 1939 they found evidence for the existence of eka-rhenium. Although they were supported by their patron, Jean Perrin (1870-1942), the “discoveries” did not receive experimental confirmation outside of France. Finally Hulubei and Cauchois observed unknown lines in the emission spectrum of radon, some of which could indicate the presence of eka-iodine among the disintegration products of this noble gas. They prematurely announced these discoveries and named these elements: moldavium (Ml), sequanium (Sq) and dor (Do). By the end of the 1940s, solid confirmations of their existence by other workers bestowed on them their final names: francium, neptunium and astatine and the elements proposed by the French-Romanian team became illegal squatters in the Periodic Table.

HIST 26 - Found, lost, and found again? The story of element 43

***Brigitte Van Tiggelen**, vantiggelen@memosciences.be. Unaffiliated, Belgium*

Once the predictive power of the periodic system became fully acknowledged by chemists, some elements were identified as “missing” for there was a box to be filled. Element 43 was one of them. Since it was a radioelement, it escaped, for a while, the isolation strategies used before the use of nuclear methods, such as the cyclotron. Indeed, 43 was claimed to be discovered many times, one of the last chapters in this saga being the claim made by Walter and Ida Noddack.

The Noddacks' claim was taken seriously at first, since they also had isolated element 75, which was indeed confirmed and called rhenium. Yet, masurium, as they named 43, could not be observed by other chemists, and only after Emilio Segrè and Carlo Perrier had produced the first known isotopes of 43, was technetium eventually accepted to fill in the gap below manganese.

The Noddacks however did not despair of one day isolating what they called “natural element 43.” This paper will show how they situated their own discovery and the later failure, based on original material found in their papers kept in Leuven, Belgium. In particular, Walter and Ida Noddack, and other chemists as well, had a slightly different conception of what an element is, compared to insights from the new emerging field of nuclear chemistry. A later attempt to isolate another unknown element will shed light on their practice and beliefs.

HIST 27 - Even ACS Presidents announced the discovery of new elements and were wrong

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Three early ACS Presidents are among the group of respected chemists who announced the discovery of new elements that were later not verified. This presentation will share first the stories of Frederick Genth and Charles Frederick Chandler supposedly isolating a new element from platinum ores. Then we will share the work of John Lawrence Smith supposedly finding mosandrium, rogerium, and columbium. All three of these chemists went on to successful careers and service as ACS Presidents, but were not successful as discoverers of "new" elements.

HIST 28 - Philatelic tribute to elements found and lost

***Daniel Rabinovich**, drabinov@uncc.edu. Department of Chemistry, The University of North Carolina at Charlotte, Charlotte, North Carolina 28223, United States*

What do the English potter Josiah Wedgwood (1730-1795), the German chemist Wilhelm Lampadius (1772-1842), and Italian physicist Enrico Fermi (1901-1954) have in common? It turns out that these accomplished individuals share the ignominy of having made claims of discovery for spurious elements, i.e., those that were subsequently found to be known chemical elements, compounds, or a combination thereof. Such is the case of the putative “elements” sydneia, wodanium, and ausonium, described respectively by Wedgwood, Lampadius, and Fermi. This presentation will use postage stamps and other philatelic materials to relate the rise and demise of selected still-born elements, as Berzelius also called them. Interestingly, Berzelius himself, for all his fame and fortune, also had a couple of misses, including his purported isolation of gahnium (1803), a substance later proved to be zinc oxide.

HIST 29 - Dr. Attila Pavlath and the California Section of the American Chemical Society

***Paul F. Vartanian**, pfvartanian@gmail.com. California Section ACS, Oakland, CA 94610, United States*

Dr. Attila Pavlath has been an integral part of the California Section of the American Chemical Society for over 45 years. He did not start out being active in the Section activities, but after several years of being a dues paying member of the Section, he became assistant treasurer in 1969. From there he became an active participant in both the Section and National American Chemical Society affairs. He has been Chair of the California Section three times over a span of 28 years, active in most of the Section's programs, and the source of many Section and ACS initiatives. He served the Society as President in 2001, the centennial year of the California Section. The main themes underlying his many ACS related activities are how the Section and Society can better serve its chemist and engineer members in their professional careers and how can members bring the excitement of chemistry we all have to the general public for the betterment of society as a whole. Memorable stories from a long and continuing association with the Section and the Society will be described.

HIST 30 - Promoting public image for chemistry: Attila Pavlath's contribution to ACS's international recognition

***Ferenc Darvas**, ferenc.darvas@thalesnano.com. ComCIX Inc., Budapest, Hungary*

Dr. Pavlath's scientific work includes numerous international activities both in research and in providing help to and building cooperation with foreign chemical societies and organizations throughout the world. He is the member of the German and Hungarian Chemical Societies and the Royal Society of Great Britain. He developed cooperation between the ACS and the Association of European Chemical and Molecular Sciences and regularly attended their annual General Assembly throughout Europe which resulted in the regular attendance of the ACS President at their meeting and the invitation of EuCheMS Presidents to ACS meetings.

He participated in the opening of the International Year of Chemistry 2011. He arranged not only the display of the posters in English and French, but also brought about the use of these posters for the celebration of IYC11 worldwide in the appropriate languages. He built strong cooperation between the United States and Japan to share research in agriculture, organized and attended annual meetings for agricultural researchers of the two countries.

After the Cultural Revolution was over, on the invitation of Chinese government he toured China talking to agricultural scientists and delivering lectures to fill them in with new developments. He was and still strongly involved in strengthening the various International ACS Chemistry Chapters and through them cooperation between U.S. and foreign chemists. He was instrumental of the creation of the Hungarian Chapter and helped them to get closer to the ACS.

HIST 31 - Survivors' tales: ACS staff reollections of a super active president

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Immediately upon election to national office, members of the Board of Directors and “presidential succession” (president-elect, president, and immediate past president) begin or in many cases continue to work with staff in a variety of capacities according to their needs and duties. Through the Office of the ACS Secretary, the president works with a staff assistant, who coordinates schedules, arranges travel, makes appointments, assists with official visits to local sections, international chapters, etc., and “other duties as requested.” This presentation focuses on the latter, drawing from recollections of staff employed at ACS during Dr. Pavlath's time on the ACS Board of Directors and as President during the Society's 125th Anniversary.

HIST 32 - Brief summary of Dr. Attila Pavlath at the USDA Western Regional Research Laboratory

***John W Finley**, jfinle5@lsu.edu. School of Nutrition and Food Sciences, Louisiana State University, Baton Rouge, LA 70803, United States*

Dr. Attila Pavlath's 45 year career at the USDA Western Regional Laboratory has resulted in a multitude of accomplishments that were timely and innovative. Among his accomplishments we will discuss the shrink proofing and soil proofing of wool, the utilization of agricultural products and bio-products for energy, the protection of produce from moisture loss, discoloration and loss of flavor and new biodegradable food pack-aging materials. Throughout his career Dr. Pavlath's research has focused on improved utilization of agricultural products to meet producer and consumer needs. In those efforts he has cleverly applied state of the art tech-nology to provide practical solutions to needs. The research has resulted in making shrink resistant and wrinkle resistant wool more competitive with synthetic fabrics, use of agricultural waste and by-products as renewable energy sources, coatings for fresh and minimally processed foods to extend shelf life and biodegradable pack-aging materials for foods. Dr. Pavlath has been a thought leader, mentor and thoughtful scientist for his entire illustrious career.

HIST 33 - Attila Pavlath: Leader, mentor, scientist, and friend

***Elizabeth Ann Nalley**, annn@cameron.edu. Physical Sciences, Cameron University, Lawton, OK 73505, United States*

Pavlath during his long professional career was an outstanding scientist and a selfless human being who has devoted much of his life to activities to improve our profession and the life of its practitioners. Dr. Pavlath had a career of 60 years in chemistry He is an internationally known scientist. Dr. Pavlath has published extensively during his long distinguished scientific career, even during his working for ten years in a restrictive industrial atmosphere. His accomplishments in chemistry are remarkable in every area. In addition to his 130+ publications, he holds 25 patents. He has received from the Secretary of Agriculture USDA's Technology Transfer Award for carrying out his research from the laboratory to commercial applications and was recently awarded the Spencer Award. For many years, but especially during the last few ones, Dr. Pavlath also worked to improve the public image of chemistry and K-12 science education both domestically and abroad. One of his greatest accomplishments has been his ability to inspire other ACS members to follow him as a leader in improving people's lives through the transforming power of chemistry. This presentation will review the profes-sional accomplishments of Attila Pavlath and will focus on the impact he has had on the leadership of the ACS.

HIST 34 - Always a pioneer: Sic itur ad astra!

***George A. Pavlath**, George_pavlath@msn.com. Unaffiliated, United States*

Perhaps it is easier to carve out a narrow scientific area and by sticking to it for a lifetime one can leisurely proceed toward international fame and recognition. However, that was not the nature of the person I am going describe. This presentation is not just my own evaluation of his spirit and driving force during his journey of 60+ years into areas to where only a few if any went before. It is also strongly supported by that of those who worked with him at various stages of his life. The chemistry presented in this talk is secondary. The few references are only given to demonstrate his willingness to attack the unknown. One does not have to be even a chemist to come to that conclusion. As a young chemist he started out on an area where the conventional chemical reactions frequently either did not work or lead to unexpected results. This was fluorine chemistry. He worked with toxic materials, he blew up a few times, but that did not hold him back. He developed new fluorinating agents to create active pesticides, soil proof surfaces and even high-energy solid oxidizers for rocket propulsion. However, he also ventured out toward new areas such as shrink proofing wool or glow discharge chemistry to help the U.S. agriculture. His aim was always what benefit the research could provide for our everyday life. His last effort was even to get to the space, but this remained a dream.

HIST 35 - Reflections on my life

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HIST 36 - The chemist and the laboratory

***Peter Morris**, peter.morris@sciencemuseum.ac.uk. Science Museum, London, England SW72DD, United Kingdom*

The chemist has helped to shape the laboratory over the last four hundred years. What does the changing appearance of the laboratory over this period tell us about the needs and preoccupations of chemists? And how have chemists changed the laboratory? Beginning with the alchemical laboratory of the late 16th century, this paper then examines Lavoisier's laboratory in the 1780s, Liebig's laboratory in the 1830s, Bunsen's in the 1850 and then the chemical palaces of the 1860s and 1870s. After examining the specialised laboratories developed for industry and government agencies, the paper concludes with the laboratories of the 1960s in Stanford and the very latest laboratories in Oxford.

HIST 37 - Women chemists in 18th century France, with an emphasis on Madame d'Arconville

***Brigitte van Tiggelen**, vantiggelen@memosciences.be. Independent Scholar, Louvain-la-neuve, Belgium*

Though a minority, women contributed to the development of chemistry through the centuries, under many roles and disguises: mythical figures, scientific muses, ingenious businesswomen or knowledgeable gentlewomen. In 18th century France, the professionalization of chemistry had not occurred, and academia or university were only one of the many settings of intellectual sociability; women, along with many amateurs, could easily take part in the scientific endeavor, from learning to circulating to producing knowledge. Among the best known figures is Marie-Anne Lavoisier, often depicted as a muse and most able assistant to Antoine-Laurent de Lavoisier, sometimes even claimed to be a chemist in her own right because of her translation work. The same accounts for Claudine Picardet, lover and later wife of Louis-Bernard Guyton de Morveau. The case of Madame d'Arconville is different: while keeping her rank and her obligations as the housewife from the parliamentary bourgeoisie, she was able to connect to a network of relatives and friends that provided her access to up-to-date scientific and medical knowledge. As an active member, she translated and even contributed with her own research. Her works were published anonymously as well as many other pieces and translation in widely different areas such as theater, poetry, philosophy, morals and history.This paper will explore her life and work and contrast them with those of other known French women chemists.

HIST 38 - "Science vs. practice" and the German chemist ca. 1860: Erlenmeyer in context

***Alan Rocke**, ajr@case.edu. Department of History, Case Western Reserve University, Cleveland, OH 44106, United States*

Emil Erlenmeyer is remembered today only as the inventor of his eponymous flask, but he was a central figure in the chemistry of his day. He began his career as a scientifically educated pharmacist, industrial consultant, and professor of applied chemistry, but about 1860 he suddenly re-invented himself as one of the most imagin-ative and prolific theoreticians in the remarkable early years of the development of structure theory. Then in 1868 he returned to his roots, accepting a professorship at the Technische Hochschule in Munich. The speaker will use Erlenmeyer's early career as a vehicle to explore the relationship between pure and applied chemistry in mid-19th-century Germany.

HIST 39 - Identities in the twentieth century

***Carsten Reinhardt**, carsten.reinhardt@uni-bielefeld.de. President, Chemical Heritage Foundation, Philadelphia, PA 19106, United States*

During the twentieth century, chemistry experienced a series of transformations that arguably greatly affected the collective identity of its practitioners. Among these transformations were the shift of the geographical center from Europe to the United States, and the rise of additional centers such as the Soviet Union, Japan, and China. Next to geographical shifts, transitions in gender roles, and an increased diversity with regards to ethnicity and social background can be observed. In addition, the rise of physical instrumentation expanded the reach of the molecular approach into the life and material sciences, and in doing so changed the outlook of chemists and chemical engineers. In my talk, I will investigate some of the effects of these changes, and discuss the question if we should talk about one professional identity or many.

HIST 40 - Chemists in American industry between the world wars

***John K. Smith**, jks0@lehigh.edu. Department of History, Lehigh University, Bethlehem, PA 18015, United States*

The American chemical industry expanded dramatically between the World Wars creating employment for thousands of chemists. By the late 1930s the American Chemical Society was the country's largest professional society. My paper examines how the growth of chemistry in industry influenced the discipline as a whole and the status of chemists in and out of academia.

HIST 41 - Patents, powders, profits: The significance of the patent infringement trial, Nobel's Explosives Co. v. Anderson (1894)

Seymour Mauskopf, *shmaus@duke.edu. History, Duke University, Durham, North Carolina 27708, United States*

This paper is about the competition between ballistite and cordite, particularly turning on the types of nitrocellulose used in each type of explosive, the interaction of Nobel with F. Abel and J. Dewar (and the bad faith of the latter two towards Nobel) and the legal significance of the verdict (which went against Nobel).

HIST 42 - Chemists and chemical societies, 1500-1900

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In the history of chemistry we often write about 'chemists' of the past. But what do we mean when we use that term? Were those 'forerunners' people like ourselves: chemical investigators, in some way educated in chemistry, getting a living out of chemistry, and calling themselves 'chemists'? During most of the period discussed in this lecture this was not the case. The speaker will present a broad 'tour d'horizon' of how within Germany, the Netherlands, Britain, North America the group of those who were called 'chemists' (or similar) gradually changed from alchemists, to medical doctors and preparers of 'chymical' remedies, to teachers of chemistry and, often, other subjects, publishing textbooks and papers on chemistry. Special attention will be paid to when and how chemistry became an 'occupation.' During that process, after about 1750, 'chemical societies' were established as well; sometimes seen as an indicator of 'professionalization.' We will therefore also discuss the nature of those societies and investigate how they changed over time.

HIST 43 - New approaches to exploring the history of chemistry through the visual arts

David B Cordes, *cordes@pacificu.edu. Chemistry, Pacific University, Forest Grove, OR 97116, United States*

Richly imaginative, highly symbolic artworks were, at one time, fairly common features of scientific communication. European alchemy of the late medieval and early modern period is particularly well known for its use of cleverly coded, sometimes obscure, engravings and etchings. Today, reliance on text, photos, and standardized graphics in the scientific literature has removed visual art and its required interpretation from the experience of both scientists and students. The fine arts are still employed by outsiders looking to comment on or critique the scientific enterprise, but the arts are rarely used by scientific practitioners themselves to advance concepts, share authentic research results, or to consider the intellectual history and development of their disciplines. This presentation will review some new ways in which chemists and other scientists can engage each other and the public through the fine arts. As the principal example, a series of contemporary oil paintings illustrating some of the history of organic chemistry is considered.

These works can serve as departure points for conversations about the history of chemistry and the cultural context that shapes and influences the development of scientific understanding and practice

HIST 44 - Alchemy in India

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Currently India is one of the largest manufacturer and exporter of some group of chemicals like pesticides, active pharmaceutical ingredients, etc. It would be interesting to take a quick look into the history of some chemical processes that were used in ancient India. Alchemy was practised extensively in India with the objectives of: (a) to get rich by converting base metals into gold and (b) to make elixir of life which will enable to live forever.

Mercury occupied a central position in alchemy in India and was considered as divine due to its physical properties such as density, appearance fluidity. However, it was subjected to multi step process, before it was considered ready for converting base metal to gold or preparation of elixir of life. Some examples of these pro--cesses are: (a) Svedana (1st step): steaming mercury with vegetables, minerals, alkalis and salts (b) Rodhana (6th step): Mixing the distilled mercury with saline water in a closed pot(c) Sarana (15th step): Digesting mercury with gold or silver in an oil base to enhance further its ability to transformation. After the 17th step, it was ready for transmutation of base metal to gold. It appears that in some cases, the colour of base metal would indeed change to gold. In some ancient texts, it has been written how to distinguish between transmuted gold and natural gold. If both are subjected to heat, the former degrades and the original base metal is seen.

One of the well-known alchemist of India is Nagarjuna. He had written several texts on alchemy. In this presentation, some interesting alchemy practices of India will be discussed.

HIST 45 - Near neighbors: Sulfuric acid producers and petroleum refineries in 19th century New York City

***Peter Spellane**, pspellane@citytech.cuny.edu. Department of Chemistry, New York City College of Technology CUNY, United States*

New York City was a center of chemicals production and petroleum refining in the second half of the 19th century. This presentation follows the development of these two industries at Newtown Creek, a narrow waterway located very near the center of modern New York City, during the decades that followed the Civil War. Particular attention is paid to the founding and growth of the Charles Pratt Oil Works and the Nichols Chemical Company, on adjoining properties along the Creek. Beginning in about 1868 the companies grew in technical sophistication, profitability, and interdependence. We use period insurance maps and modern GIS methods to examine Newtown Creek's economic geography and to understand the significance of place in enabling the growth of the area's materials-based economy and of New York City itself. Insurance maps indicate locations and facilities of the then-new companies. We consider the relationships among three chemistry-intensive industries at Newtown Creek: sulfuric acid production, the electrolytic production of high purity copper metal, and the refining of petroleum.

HIST 46 - Modern chemical warfare: History, chemistry, morality, a recollection and reflection at the centenary of World War I

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In August 1914, World War I started. Modern chemical warfare began during the war when the German army released 168 tons of chlorine gas on the Belgian front, killing or injuring thousands of Allied (Triple-Entente) soldiers. The Allies responded in kind, and at least 30 substances were used as chemical weapons in the war, including arsenicals, mustard "gas", bromoacetone, chloropicrin, trichloromethyl chloroformate, phosgene, and hydrogen cyanide. Ca. 91,000 were killed by chemical weapons in WWI and ca. 1.2 million injured, often with permanent effects. Mustard agent [bis(2-chloroethyl) sulfide], highly toxic to humans, was particularly devastat-ing and terrorizing. On both sides, many scientists, including eminent chemists, participated in chemical-warfare work, e.g., F. Haber (Nobel laureate, 1918), O. Hahn (Nobel 1944), W. Nernst (Nobel 1920), G. N. Lewis, R. Adams, W. J. Pope, E. Paternò, V. Grignard (Nobel 1912), etc. But some refused to participate, e.g., E. Ruther-ford (Nobel 1908), H. Staudinger (Nobel 1953), M. Born (Nobel 1954). The Hague treaties (1899, 1907) unequi-vocally banned poison weapons but were ignored. Since WWI, other treaties have prohibited chemical weapons (e.g., Geneva Protocol, 1925; Chemical Weapons Convention, 1993) but chemical warfare has continued, e.g., by Spain (in Morocco, 1920s), Soviet Union (Tambov rebellion, 1921), Italy (Ethiopia, 1935), Japan (China, 1938-39), US (Vietnam, 1960s-70s); Iraq (1980s). New, even more toxic weapons ("nerve agents", e.g., sarin) have been developed and used, even against civilian populations (e.g., in Syria, 2013). This history raises diffi-cult questions concerning the morality of participation by scientists and industry in weapons-of-mass-destruction development.

HIST 47 - ORGN's website: A resource for the study of the history of chemistry and an inspiration to study the history of chemistry

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This presentation will delineate the progression of the ACS Organic Division's website (organicdivision.org) from a simply crafted site to one of significant complexity and broad content over the approximately 20 years of its existence. A brief explanation of how certain resources (for laboratory chemists) came to be associated with Organic Division's site will be offered. The bulk of the presentation will focus on how this website initiated, motivated, and enabled a serious investigation into the history of the National Organic Chemistry Symposium (NOS), which was published in the Journal of Organic Chemistry whose readers are primarily experimental chemists, not historians. In addition, this presentation will involve a discussion of the resources on the site that may well serve those interested in the history of the development of modern organic chemistry.

HIST 48 - History and development of the reaction mechanisms conference

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The Reaction Mechanisms Conference (RMC) was first held in 1946 and has been held in even numbered years ever since. Charles C. Price and Paul D. Bartlett organized the first RMC and played pivotal roles in establishing the RMC as an ongoing venue that contributed to the growth and maturation of physical organic chemistry. Early RMC were relatively small meetings limited to insiders who were invited. Attendance at the RMC later expanded and became more open. The history and development of the RMC will be presented including an analysis of trends in the prevalence of subdisciplines presented at the 34 conferences.