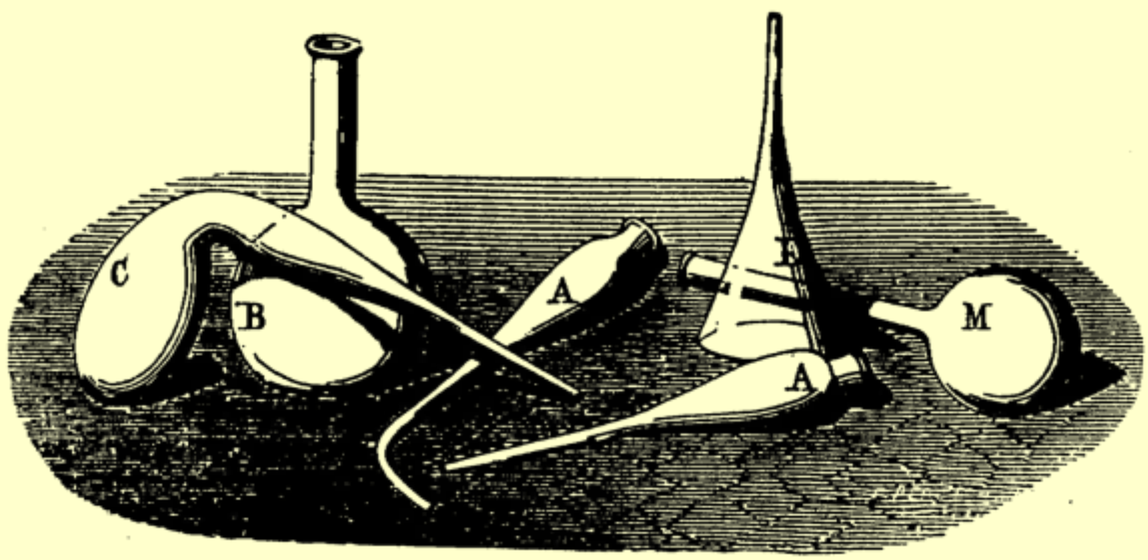
American Chemical Society

DIVISION OF THE HISTORY OF CHEMISTRY



PROGRAM & ABSTRACTS

251st ACS National Meeting
San Diego, CA
March 13-17, 2016

S. C. Rasmussen, Program Chair

Final Program
HIST

DIVISION OF THE HISTORY OF CHEMISTRY

S. C. Rasmussen, *Program Chair*

SUNDAY MORNING

Section A

Hilton San Diego Bayfront - Aqua 311 A/B

General Papers

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

8:30 HIST 1: Intersection of art and science in the discovery of molecular chirality by Louis Pasteur (1822-1895) in 1848. **J. Gal**

9:00 HIST 2: The Royal Society of Chemistry: History now online. **S. Dabb**

9:30 HIST 3: Butlerov Museum of the Kazan School of Chemistry. **A. R. Davis, E. T. Walsh**, D. E. Lewis

10:00 Intermission

10:15 HIST 4: Philatelic history of vitamin C. **D. Rabinovich**

10:45 HIST 5: Astatine – The Elusive One. **K. Kostecka**

11:15 HIST 6: Robert Boyle and Urban Hjarne: At the Crossroads. **S. Mitra**, S. B. Mitra

SUNDAY AFTERNOON

Section A

Hilton San Diego Bayfront - Aqua 311 A/B

Preceptors of Chemistry

Cosponsored by: CHED

G. D. Patterson, *Organizer, Presiding*

1:00 Introductory Remarks

1:05 7. Ghost of Libau and problems with teaching "chemistry". **B.T. Moran**

1:35 8. Herman Boerhaave and the use of demonstration-experiments in chemistry Courses. **J.C. Powers**

2:05 9. Teaching chemistry in eighteenth-century France. **B. Bensaude-Vincent**

2:35 HIST 10. Withdrawn

3:05 Intermission

3:15 11. Mendeleev and the Chemistry Textbook in Russia. **V. V. Mainz**

3:45 12. Fred Basolo and the (re)naissance of American inorganic chemistry. **J. A. Labinger, H. B. Gray**

4:10 13. Paul Doughty Bartlett: Evangelist for mechanistic organic chemistry. **S.J. Weininger**

4:35 14. Linus Pauling: the right to be wrong. **G. D. Patterson**

SUNDAY EVENING

Hilton San Diego Bayfront - Aqua 303

5:00 - 8:00 HIST Executive Committee Meeting

MONDAY MORNING

Section A

Hilton San Diego Bayfront - Aqua 311 A/B

The Posthumous Nobel Prize in Chemistry. Correcting the Errors & Oversights of the Nobel Prize Committee

T. Strom, *Organizer*, *Presiding*

8:40 Introductory Remarks

8:45 HIST 15. The Nobel Prize: A brief overview. W. Jensen, **T. Strom**

9:15 HIST 16. Dmitri Mendeleev's Nobel-prize-losing research. **C. J. Giunta**

9:45 HIST 17. Who got Moseley's prize? **V. L. Trimble**

10:15 Intermission

10:30 HIST 18. Herman Mark's claim to fame. **G. D. Patterson**

11:00 HIST 19. Wallace Carothers and polymer chemistry: A partnership ended far too soon. **E. T. Strom**

11:30 HIST 20. BET equation: Nominated but not selected. **B. H. Davis**

MONDAY AFTERNOON

Section A

Hilton San Diego Bayfront - Aqua 311 A/B

The Posthumous Nobel Prize in Chemistry. Correcting the Errors & Oversights of the Nobel Prize Committee

T. Strom, *Organizer*, *Presiding*

1:30 HIST 21. Yevgenii Konstantinovich Zavoiskii (1907-1976): Overlooked pioneer in magnetic resonance. **D. E. Lewis**

2:00 HIST 22. Between two stools: Pauling, Mulliken and Michael J. S. Dewar. **E. Healy**

2:30 HIST 23. Hammett deserved a Nobel Prize. **C. Perrin**

3:00 Intermission

3:15 HIST 24. R. B. Woodward: One was just not enough. **J. Seeman**

3:45 HIST 25. Neil Bartlett: No Nobel for noble gases: Some guesses why. **J .F. Liebman**

4:15 HIST 26. Proposing Howard E. Simmons, Jr. **P. Laszlo**

MONDAY EVENING

Section A

San Diego Convention Center - Halls D/E

Sci-Mix

S. C. Rasmussen, *Organizer*

8:00 - 10:00

HIST 1, HIST 11, HIST 16. See previous listings.

HIST 27. Translation of Markivcnikov's Magistr Khimii dissertation: A progress report. **A. R. Davis, E. T. Walsh**, D.E. Lewis

TUESDAY MORNING

Section A

Hilton San Diego Bayfront - Aqua 311 A/B

General Papers

S. C. Rasmussen, *Organizer*
N. V. Tsarevsky, *Presiding*

9:00 HIST 28. Oldest planetary astrochemical mystery, Jupiter's great (but shrinking) red spot. **R. L. Hudson**

9:30 HIST 29. Eponym's curse. **V. L. Trimble**

10:00 Intermission

10:15 HIST 30. Gilbert Lewis and the conceptual evolution of the chemical bond. **S. Mitra**

10:45 HIST 31. R. J. P. Williams and the chemical sequence of natural history. **B. J. McFarland**

Memorial Symposium Honoring Karen J. Brewer

Sponsored by INOR, Cosponsored by HIST

TUESDAY AFTERNOON

Memorial Symposium Honoring Karen J. Brewer

Sponsored by INOR, Cosponsored by HIST

WEDNESDAY MORNING

History of Chemistry and Computing

Sponsored by MPPG, Cosponsored by COMP and HIST

Memorial Symposium Honoring Karen J. Brewer

Sponsored by INOR, Cosponsored by HIST

WEDNESDAY AFTERNOON

Memorial Symposium Honoring Karen J. Brewer

Sponsored by INOR, Cosponsored by HIST

HIST 1 - Intersection of art and science in the discovery of molecular chirality by Louis Pasteur (1822-1895) in 1848

Joseph Gal[2,1], *joe.gal@ucdenver.edu. (1) Clinical Laboratory, University of Colorado Hospital, Aurora, Colorado, United States (2) Departments of Medicine and Pathology, University of Colorado School of Medicine, Aurora, Colorado, United States*

Pasteur's discovery of molecular chirality was a fundamental advance in chemistry. His key findings were that the crystals of (+)-tartaric acid and its salts were hemihedral and chiral, and sodium ammonium (±)-tartrate produced two crystal forms that he recognized as non-superposable-mirror-image counterparts (enantiomorphs). Before Pasteur, prominent scientists Jean-Baptiste Biot (1774-1862), Eilhard Mitscherlich (1794-1863), Frédéric-Hervé de la Provostaye (1812-1863), and Wilhelm Gottlieb Hankel (1814-1899) had studied tartrate crystals but failed to notice their chirality. What allowed Pasteur to recognize crystal chirality missed by his predecessors? Some argue that Pasteur's poor eyesight forced him to observe meticulously; others credit his scientific intelligence. However, Pasteur's eminent predecessors too had powers of observation and scientific acumen. Is there another explanation? Pasteur was a talented artist who from age 13 to 19 executed ca. 40 portraits of friends, relatives, dignitaries, etc., in pastel, charcoal, pencil, or lithography. Pasteur's artistic talents, acclaimed by artists, e.g., renowned Finnish painter Albert Edelfelt (1854-1905), likely aided his recognition of crystal chirality. Specifically, in lithography the final image is the mirror reflection of the initial drawing, and in 1841 Pasteur expressed concern with lithographic mirror reversal. Conclusion: art sensitized Pasteur to non-superposable mirror reflection, thereby presumably facilitating his discovery of molecular chirality.

HIST 2 - The Royal Society of Chemistry: History now online

Serin Dabb, *dabbs@rsc.org. The Royal Society of Chemistry, Cambridge, United Kingdom*

The Royal Society of Chemistry recently launched its Historical Collection. This collection covers the development and evolution of the chemical sciences from the 16th century to the 20th century, as well as the publications of learned chemical societies. There is an extensive range of historical items including books, journals, letters, lecture notes, pamphlets, monographs, minutes and magazines, which were previously unavailable online. The collection is segregated into two parts; society publications and minutes, and the historical books and papers from our library. We will discuss how we converted our collection to an online resource, and the eclectic and remarkable pieces you can find.

HIST 3 - Butlerov Museum of the Kazan School of Chemistry

Alexander R. Davis, *davisar@uwec.edu,* ***Eugene T. Walsh***, *walshet@uwec.edu, David E. Lewis. Chemistry Department, UW-Eau Claire, Eau Claire, Wisconsin, United States*

During June, 2015, we had the ooportunity to work in the Butlerov Museum of the Kazan School of Chemistry, and to record several important manuscripts, including Markovnikov's *Magistr Khimii* and *Doktor Khimii* dissertations. The Kazan School of Chemistry produced such luminaries as Karl Karlovich Klaus (the discoverer of ruthenium), Nikolai Nikolaevich Zinin (discoverer of the reduction of nitrobenzene to aniline), Aleksandr Mikhailovich Butlerov (the structural theory of organic chemistry, and the first organozinc synthesis), Aleksandr Mikhailovich Zaitsev (Zaitsev's Rule), Vladimir Vasil'evich Markovnikov (Markovnikov's Rule), Yegor Yegorovich Vagner (Wagner; oxidation of alkenes with potassium permanganate), Sergei Nikolaevich Reformatskii (the Reformatskii reaction), and Aleksandr Yerminimgel'dovich Arbuzov (the Arbuzov rearrangement). The museum contains such historical artifacts as Klaus' first samples of ruthenium metal and ruthenium dioxide, and Zinin's first sample of aniline, as well as samples of phenol used by Arbuzov at the Krestovnikov Brothers plant for the manufacture of aspirin during World War I and the Russian revolution. The Butlerov Museum will be described, along with other museums of the university (e.g. the Zavoiskii office-laboratory museum).

HIST 4 - Philatelic history of vitamin C

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

Vitamin C (L-ascorbic acid) is an essential nutrient for humans and a well-known antioxidant against oxidative stress. This simple molecule has played a fascinating role in history ever since James Lind, a physician in the British Royal Navy, established in the mid-18th century the relationship between the consumption of citrus fruits and fresh vegetables rich in vitamin C and the prevention of scurvy. In this regard, Jay Burreson and Penny Le Couteur argue in their provocative book "Napoleon’s Buttons" that vitamin C may well be responsible for extending the trade routes to the Americas and the Far East during the 17th and 18th centuries. The history of vitamin C, including its isolation, structural elucidation, and synthesis in the 20th century, will be outlined in this presentation and illustrated with postage stamps and other philatelic materials.

HIST 5 - Astatine: The elusive one

***Keith Kostecka**, kkostecka@colum.edu. Science and Mathematics, Columbia College - Chicago, River Forest, Illinois, United States*

Astatine, the last member of the halogens and the rarest naturally occuring element, was first isolated by Corson, Mackenzie and Segre in 1940 [though this isolation had been attempted by many during the 1930s]. This elemenent has an intereresting set of physical and chemical properties and, in addition, a fairly rich chemistry. It exists in a large number of isotopes where astatine-210 is the most stable and is generally produced by bombardment of bismuth-209 with energetic alpha particles. Astatine, after its formation, must only be separated from the target and any possible contaminants. The element may also have use in ongoing research work in nuclear medicine; it also requires precautions in its useage.

HIST 6 - Robert Boyle and Urban Hjarne: At the crossroads

***Smarajit Mitra**[1], smarajitmitra@hotmail.com, Sumita B. Mitra[2]. (1) Mitra Chemical Consulting LLC, Saint Paul, Minnesota, United States (2) Mitra Chemical Consulting LLC, St. Pete Beach, Florida, United States*

Through the major part of the second half of the seventeenth century, Urban Hjarne in Sweden and Robert Boyle in England were, amongst others, towering figures in the
intellectual communities in Europe. They influenced not only the field of chemistry but many areas of physical sciences, natural philosophy and even literature. While Boyle immersed himself in the properties of air, Hjarne branched out into geology and mineralogy. In this talk, their concurrent lives will be compared, sometimes running parallel and at others crossing each other’s path. Their different worldviews finally culminated in the opposing positions they took on the fundamental nature of matter.

HIST 7 - Ghost of Libau and problems with teaching “chemistry”

***Bruce T. Moran**, moran@unr.edu. History, University of Nevada, Reno, Reno, Nevada, United States*

In July 2015 a new plaque was installed in the German city of Marburg by the Society of German Chemists honoring Johannes Hartmann (1568-1631) as the first professor of chemical pharmacy and his *laboratorium chymicum publicum* as the “earliest university laboratory for the instruction of chemistry.” However, when Hartmann started teaching “chemistry” the battle over what the discipline of chemistry was, was still being fought. From some points of view what formed the basis for what Hartmann taught at Marburg was something altogether despicable, and qualified as neither an “art” nor a “science.” One person to object vociferously to Hartmann’s teaching was Andreas Libau (also called Libavius), a physician, schoolmaster, and alchemist living for the most part in the German city of Coburg. When Libau learned that a public chemical laboratory was to be erected at Marburg, he must have been delighted. When he learned that Hartmann was to teach “chemistry” there, it was probably one of the worst days of his life. If the ghost of Andreas Libau had been in the crowd at Marburg last July, how would it have reacted? And why would Libau’s ghost have perhaps chilled those assembled by roaring out that, although correct in drawing attention to the teaching of techniques and practices, the Marburg plaque, in other respects, had really missed the mark?

HIST 8 - Herman Boerhaave and the use of demonstration-experiments in chemistry courses

***John C. Powers**, jcpowers@vcu.edu. Dept. of History, Virginia Commonwealth University, Richmond, Virginia, United States*

Herman Boerhaave (1668-1738) was one of the most prolific teachers of chemistry and medicine in the earthly Eighteenth Century; his student Albrecht von Haller called him the "*communis Europae praeceptor.*" One of Boerhaave's pedagogical innovations in his chemistry course was his use of demonstration-experiments to build theoretical claims. His use of these experiments moved beyond the traditional demonstrations of how to make medicaments and other chemical products that had been a staple of chemistry textbooks for more than a century. Rather, he intended his demonstrations to reveal latent characteristics and relationships between substances, about which he could theorize to his students. To do this, he worked out his demonstrations ahead of time, often incorporating novel instruments, such as thermometers, air pumps, and other custom apparatus, previously little used in chemistry. This paper examines a handful of Boerhaave's demonstrations in detail, by discussing their origins, how he worked them out, and how they persisted in the chemical literature of the 18th century, even as the theoretical interpretations of the experiments were altered or dismissed by later chemists.

HIST 9 - Teaching chemistry in eighteenth-century France

***Bernadette Bensaude-Vincent**, Bernadette.bensaude-vincent@univ-paris1.fr. History, Universite Paris1, Paris, France*

During the eighteenth-century chemistry became an autonomous science taught in many parts of Europe. This promotion was the result of efforts made by public lecturers and professors who taught chemistry in a variety of sites (apothecaries, schools of mines, botanical gardens, private laboratories…).This paper will focus on three famous French public demonstrators – Guillaume-François Rouelle, Gabriel Venel and Pierre-Joseph Macquer – who contributed to the prestige and dissemination of chemistry as well as to the training of Lavoisier.

HIST 10 - Withdrawn

HIST 11 - Mendeleev and the chemistry textbook in Russia

***Vera V. Mainz**, mainz@illinois.edu. School of Chemical Sciences, University of Illinois at Urbana-Champaign, Urbana, Illinois, United States*

Dmitrii Ivanovich Mendeleev (1834-1907) is known for his discovery in 1869 of the periodic law of the chemical elements, leading to the concept of the periodic table. Many, including Mendeleev, ascribe this discovery to his work in writing a general chemistry textbook for the Russian student, *Osnovy khimii* or *The Principles of Chemistry*. The Principles was one of many textbooks written in Russian for a Russian audience by Mendeleev — he could be said to have brought the modern chemistry textbook written in the Russian language to Russia. He wrote an organic chemistry textbook (1861) and translated and enlarged the analytical chemistry textbook of Gerhardt and Chancel (1864-1866), prior to the publication of the Principles. This talk will present an overview of the influence of Mendeleev's textbooks on chemistry teaching in Russia.

HIST 12 - Fred Basolo and the (re)naissance of American inorganic chemistry

***Jay A. Labinger**, jal@its.caltech.edu, **Harry B. Gray**, hbgray@caltech.edu. California Institute of Technology, Pasadena, California, United States*

It was an Australian/British chemist, Sir Ronald Nyholm, who first spoke of a "renaissance" of inorganic chemistry; but its emergence as a newly dynamic subfield, beginning in the 1950s, can be seen even more clearly in the US. While John Bailar is often credited as the "Father of American Inorganic Chemistry," it is arguable that Fred Basolo, Bailar's student at Illinois, has had the most lasting impact on the dramatic growth of the field in American academia. Our justification for that assertion will include comments and reminiscences from the students (one of them first-person!) he trained, as well as an examination of his seminal contributions

in the form of both original research and textbooks, particularly the groundbreaking 1958 work “Mechanisms of Inorganic Reactions,” written with his Northwestern colleague Ralph Pearson, which played a central role in raising the intellectual stature of inorganic chemistry by bringing the study of mechanism to the forefront.

HIST 13 - Paul Doughty Bartlett: Evangelist for mechanistic organic chemistry

Stephen J. Weininger*, stevejw@wpi.edu. Chemistry, Worcester Polytechnic Institute, Brookline, Massachusetts, United States*

Unlike the other preceptors in this Symposium, Paul Bartlett of Harvard and Texas Christian Universities never succeeded in writing a textbook. He eventually consigned his incomplete efforts to a file entitled “Life’s Too Short.” Nonetheless, he deserves the designation Preceptor for having released a burgeoning new field, mechanistic organic chemistry, from the confines of the academic laboratory into industrial laboratories and production lines. He also promoted its establishment and growth beyond the Anglophone chemical community. The acknowledged “father” of mechanistic, or physical, organic chemistry, C. K. Ingold of University College London, was uninterested in its possible applications. Bartlett, by contrast, worked out mechanisms for several reactions vital to the World War II military effort. One of these involved free radical chemistry, an area neglected by the Ingold group. Furthermore, during the postwar era Bartlett taught courses on organic mechanisms for several industrial firms. His laboratories hosted numerous foreign students, especially from Germany and Japan. Speaking in German, Bartlett lectured at several German universities in 1954 on contemporary developments in organic mechanistic studies. Although there had been several isolated German chemists doing notable mechanistic investigations, the formation of a German physical organic research community was galvanized by Bartlett’s visit.

HIST 14 - Linus Pauling: The right to be wrong

Gary D. Patterson*, gp9a@andrew.cmu.edu. Carnegie Mellon University, Pittsburgh, Pennsylvania, United States*

Linus Pauling was one of the most important preceptors in the history of Chemistry. He was exceptionally well educated and displayed ability in teaching even in undergraduate school. He received the Nobel Prize in Chemistry in 1954 largely for his Baker Lecture monograph: “The Nature of the Chemical Bond (1939).” But, this document is more of a teaching tool than a book for experts. He produced the most influential text for general chemistry in 1947. It was subtitled “An introduction to descriptive chemistry and modern chemical theory.” It does indeed contain an enormous amount of descriptive chemistry. But, what kind of theory is presented? Pauling chose to create conceptual schemes that could be used by any chemist, rather than empirically adequate theories that were as rigorous as could be produced at the time. He invented arbitrary quantities like electronegativity; a semi-quantitative tool rather than a measurable property. He used the conceptual scheme of G. N. Lewis to describe molecules, rather than a more modern molecular orbital approach. This allowed all chemists to reason about molecular structure, even those who could not solve the Schrodinger equation. He left the rigor for the physicists and the chemical experts.

HIST 15 - The Nobel prize: A brief overview

William Jensen[1], ***Tom Strom[2]****, tomstrom@juno.com. (1) Department of Chemistry, University of Cincinnati, Cincinnati, Ohio, United States (2) Department of Chemistry and Biochemistry, University of Texas, Arlington, Arlington, Texas, United States*

This introductory lecture will provide background for the symposium which follows by offering a brief overview of the Nobel Prize, including its history, nomination and evaluation procedures, restrictions on possible recipients, summary statistics relative to previous prizes in chemistry, and mention of various controversies over the nature of some of the earlier awards.

HIST 16 - Dmitri Mendeleev's Nobel-prize-losing research

Carmen J. Giunta*, giunta@lemoyne.edu. Le Moyne Coll, Syracuse, New York, United States*

Dmitri Mendeleev (1834-1907), the scientist most closely associated with the establishment of the periodic law and that icon of chemistry, the periodic table, never received the Nobel prize. Why not? He was still alive when the first six chemistry prizes were awarded, but he was not even nominated until the last three years of his life. Rules about recognizing recent work probably prevented his nomination for the first few years of the prize. Researchers into the Nobel archives point to the influence of Svante Arrhenius as the principal obstacle preventing Mendeleev from receiving the prize in 1906. The fate of Mendeleev's nominations will be described and discussed. Near the end of his life, Mendeleev was skeptical of such important scientific developments as the divisibility and transformability of atoms, and his prediction of the existence of elements lighter than hydrogen proved to be elusive. The work that arguably lost Mendeleev the Nobel prize, however, was most likely his hydration theory of solution and, more to the point, his criticism of the ionic dissociation theory in the 1880s.

HIST 17 - Who got Moseley's prize?

Virginia L. Trimble*, vtrimble@astro.umd.edu. Dept of Physics & Astronomy, University of California Irvine, Irvine, California, United States*

Henry Moseley presumably thought of himself as a physicist, but the impact of his 1913-1914 papers on chemistry was profound, clarifying the order of the elements in the periodic table. This presentation will focus on what Moseley did (the samples were much smaller than I would have guessed), and the context in which his work was performed and then abandoned for voluntary active duty.

HIST 18 - Herman Mark's claim to fame

Gary D. Patterson*, gp9a@andrew.cmu.edu. Carnegie Mellon University, Pittsburgh, Pennsylvania, United States*

Herman Mark was one of the greatest scientists of the 20th century, but he did not win a Nobel Prize. He was Austrian in a century when leaving was the best career path. He was educated in Germany and worked for Bayer, but his Jewish background made that country unwelcoming. He made his home in America and founded the Polymer Research Institute at the Polytechnic Institute of Brooklyn, but he was a physicist and the chemistry community had other heroes to promote. He was affectionately known as the *Geheimrat* of polymer science, and he made everyone he knew better. But, there is no one accomplishment that caught the fancy of the type of people in America who nominate Nobel Prize winners in chemistry or physics. His major accomplishments will be surveyed, and they will be placed in historical context, but it is not that surprising that he was denied world recognition in Sweden. The Germans would have vetoed any such award!.

HIST 19 - Wallace Carothers and polymer chemistry: A partnership ended far too soon

E T. Strom*, tomstrom@juno.com. Chemistry and Biochemistry, University of Texas at Arlington, Dallas, Texas, United States*

The nine year career of Wallace H. Carothers at DuPont was incredibly productive for both DuPont and for polymer chemistry. The Carothers group produced two landmark products, Nylon and Neoprene rubber, while polymer chemistry became credible within the chemical discipline and was put on a firm basis. As an example of Carothers' impact on the science, the beginning polymer student now learns the Carothers equation as a way of calculating the degree of polymerization in condensation polymerization and the Carothers gelation equation as a way of determining the gel point of a polymerization. Carothers would be a "slam dunk" as a recipient of a posthumous Nobel Prize, but the presenter will make the case that Carothers would have been a viable candidate for the Nobel Prize in 1936, provided a suitable, prestigious nominator could have been found.

HIST 20 - BET equation: Nominated, but not selected

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

The experimental and theoretical development of the Brunauer-Emmett-Teller method to measure the surface area of porous materials will be described. It was nominated for the award but was not selected. Over the years, the citations for the method have been steadily increasing and is one of the most cited publications. Brunauer and his wife were prominently involved in the McCarthy attacks on communism in the US Government. Teller certainly merited consideration for his contributions to this equation but also many others as well. The impact of his involvement in politics, especially his testimony against J. Robert Oppenheimer and his promotion of the H-bomb, will be considered.

HIST 21 - Yevgenii Konstantinovich Zavoiskii (1907-1976): Overlooked pioneer in magnetic resonance

***David E. Lewis**, lewisd@uwec.edu. Chemistry Department, UW-Eau Claire, Eau Claire, Wisconsin, United States*

The Nobel Prize has been awarded five times since 1944 for developments in nuclear magnetic resonance: the Physics prize was awarded in 1944 and 1951, the Chemistry prize in 1991 and 2002, and the prize in Physiology or Medicine in 2003. Zavoiskii was Professor of Physics at Kazan University, and while there he began working on magnetic phenomena. It is possible that he observed the first NMR signal, but the homogeneity of his magnetic field was not stable enough to permit the reproducible detection of the signal. The advent of World War 2 led to the cessation of this line of research, and after a short period of time doing manual work for the Soviet army, he returned to the research laboratory. Here he worked on electron paramagnetic resonance, and he built the first functioning EPR spectrometer. Zavoiskii's life and career will be discussed, and possible reasons why his pioneering research he failed to garner the Nobel Prize will be proposed.

HIST 22 - Between two stools: Pauling, Mulliken, and Michael J. S. Dewar

***Eamonn Healy**, healy@stedwards.edu. St. Edwards University, Austin, Texas, United States*

In a wonderful review of Michael's autobiography, *A Semiempirical Life*, the reviewer correctly notes that Michael "…contributed as much or more to the development of practical Molecular Orbital theory than anyone else. His methods and computer programs for semiempirical MO calculations are now used by chemists everywhere. He was at the same time brilliant and insufferable, but above all a delightful human being. His interests were broad ranging; his imagination boundless." The reviewer finishes by stating that "…there can be no doubt whatsoever that had Michael J. S. Dewar been more tactful in speaking his mind, he would have been awarded the Nobel Prize in Chemistry". With the benefit of hindsight this presentation seeks to probe the truth, or otherwise, of this last claim.

HIST 23 - Hammett deserved a Nobel prize

***Charles Perrin**, cperrin@ucsd.edu. University of California, La Jolla, California, United States*

Louis Hammett deserved a Nobel Prize in Chemistry for making quantitative the relation between rate constants and acidity constants of benzoic acids. His equation established organic chemistry as a science with regularities, rather than only a collection of observations and preparations. His 1940 monograph, Physical Organic Chemistry, was instrumental in giving a name to this field and establishing its credibility. The resulting predictability of reactivity represents a benefit to humanity.

HIST 24 - R. B. Woodward: One was just not enough

***Jeffrey Seeman**, jiseeman@yahoo.com. University of Richmond, Richmond, Virginia, United States*

Robert Burns Woodward (April 10, 1917 - July 8, 1979) was one of the greatest chemists of all time. He received his Nobel Prize in 1965 for ""for his outstanding achievements in the art of organic synthesis." Perhaps this great scientist, who loved and pursued the limelight and was universally acclaimed in both his lifetime and even today, nearly 40 years after his death, deserved even more.

HIST 25 - Neil Bartlett: No Nobel for noble gases: Some guesses why

***Joel F. Liebman**, jliebman@umbc.edu. Chemistry and Biochemistry, University of Maryland, Baltimore County (UMBC), Baltimore, Maryland, United States*

In 1962, Bartlett published a one page note describing the synthesis and energetics of the first xenon-containing compound: Xenon hexafluoroplatinate(V), *Proc. Chem. Soc. London*, 1962, 216. This resulted in a flurry of activity by experimentalists and theorists, seasoned scientists and students, alike. Other comparably brief studies reported the synthesis of the binary, and therefore simpler, species XeF_4 and then XeF_2. An edited volume on noble gas chemistry followed the next year as well as the synthesis of KrF_2. In the same year, a college Chem 1 lecture stimulated the author of this talk in his later choice of doctoral studies. Inert gases were not inert, the octet rule was shattered, the understanding of chemistry was irrevocably altered. With such a seminal scientific seismic shift, why then did Bartlett never win the Nobel Prize for his discovery? Some possible reasons follow: Others had predicted before, and many others experimented and explained soon afterwards, the existence of noble gas compounds. Xenon-containing species were “in the air”. Such species were “too normal”, conventional, sensible; Noble gas chemistry was too novel. The simply described experiments still involved the too exotic reagents, such as PtF6 and elemental fluorine; The octet rule was long violated by such commonplace species as PCl_5 and H_2SO_4; Noble gas chemistry was the science of essentially only one element, Xe; Bartlett was “too optimistic”, if not, “egotistical” -- his compound was not $Xe^+ [PtF_6]^-$ but rather ill-defined; Bartlett was too humble to advertise himself and the specialness of his accomplishment – he never was a member of the *nobility*.

HIST 26 - Proposing Howard E. Simmons, Jr.

***Pierre Laszlo*[1,2]**, *pierrelaszlo@usa.net. (1) Chemistry, Ecole polytechnique, Senergues, France (2) Institut de Chimie, University of Liège, Belgium, Liège, Belgium*

The Nobel Prize rewards the author of a major discovery. However, there are other avenues to the advancement of knowledge. Its dissemination occurs not only from publications in peer-reviewed scholarly journals, also through the patent literature. Industrial laboratories prepare novel materials and devise technical applications for them. Sometimes — Bell Laboratories is a prime example — they engage in pure science as well. While expertise in a field may bring eminence with it, the complementary role of polymaths is equally essential. Leadership in exploration entails judgment in surrounding oneself with lieutenants, wisely chosen for their potential. Because Howard Ensign Simmons, Jr. (1929-1996) who directed the Experimental Station at DuPont, in Wilmington, Delaware, excelled in all these other characteristics, he is, I submit, a prime candidate for one of the honorary Nobel Prizes in chemistry.

HIST 27 - Translation of Markivcnikov's Magistr Khimii dissertation: A progress report

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During June, 2015, we were able to obtain digital copies of the *Magistr Khimii* and *Doktor Khimii* dissertations of Vladimir Vasil'evich Markovnikov. The translation of these documents into English consists of two distinct phases. First, the pre-Soviet Russian of the original document needed to be translated (transliterated) into modern Russian—after the Russian revolution, four letters were eliminated from the Cyrillic alphabet entirely, and the spelling of many words was simplified. For example, only one vowel for 'i' now appears in modern Russian, and there are two, not three representations of 'e'; the hard sign, which was widely used in early Russian at the end of words is now used rarely, and then only in the middle of words. Following the modernization of the Russian, the translation into English is now being carried out. Herein, we will report our progress in the translation of the *Magistr Khimii* dissertation.

HIST 28 - Oldest planetary, astrochemical mystery: Jupiter's great (but shrinking) red spot

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Jupiter's Great Red Spot (GRS) is arguably one of the more recognizable extraterrestrial features in the Solar System, ranking near Saturn's rings and the polar caps of Mars. Although many proposals have been made to explain the GRS's color, no consensus has been reached as to the most likely chromophore. This presentation will review the history of some of these suggestions, including materials that can be traced to Robert Boyle in the 17th century and the Polaroid Corporation in the 20th. Both astronomical challenges and chemical obstacles will be addressed. The recent discovery that the GRS is shrinking has added urgency to the solution of this astrochemical mystery.

HIST 29 - Eponym's curse

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Yes, that's an Erlenmeyer flask, but which is the Plucker tube, the Pitot tube, and the Buchner funnel? Gimbattista Riccioli, and Italian Jesuit, probably started it all by blanketing his 1651 lunar map with the names of dozens of

Greek, Roman, early Christian, medieval, and Renaissance scholars. The 21st century version has been the naming of mountains, craters, plains, and everything else on planets and other moons according to complex rules devised by the International Astronomical Union (which also names comets and asteroids, with exoplanets coming next). But it was the International Union of Pure and Applied Chemistry that gave 12 of the 19 most recent elements to people, rather than places, properties, or characteristic reactions. The Heck process you probably remember (he just died in October) and perhaps Ostwald, Pasteur, and Haber. But Birkeland-Hyde, Bucher, Caro & Franke, Coslett, Fischer-Tropsch, Mercer, Parker, Schoop, and Serpek? Hall has both a process and a current (not the same Hall). Centigrade has become Celcius, and the atomic mass unit (amu) is fading into the Dalton. Nearly all the units of electromagnetism, from Ampere to Tesla, are eponyms, with very little correlation between what folks did and what is named for them. Where's the harm if the scientific community wishes to honor its own in this fashion (or even, as less generous commentators have said, things get named for the first person who fails to credit his predecessors)? First is the loss of information, as per Celcius, Dalton, and the threatened renaming of the Cepheid period-luminosity relation as Leavitt's law. An ideal gas law tells you what it is good for far better than Boyle's and Charles'. Second is the simplified, even erroneous, history encapsulated (Hubble's law, so called because it was discovered by Lundmark is a classic astronomical example, but I would not want to have to defend Biot-Savarin, Clausius- Clapeyron, Dulong-Petit, or Guy-Lussac either). Third, what happens when either the persona or the concept is declared non-grata? A few years ago, Debye had a posthumous narrow escape from losing his institute and perhaps even his degree. Luckily his length was not endangered before the fuss had died down. Meanwhile, anyone for Blanc's rule or Mattauch's law? The presentation will include a long list, but focus on a few cases the presenter regards as interesting.

HIST 30 - Gilbert Lewis and the conceptual evolution of the chemical bond

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This marks a landmark year in the development of the concept of a chemical bond as it relates to participation of electrons of the atoms involved. The ideas of valence and the possible stereo-chemical orientations of such valences were already generally accepted through the work of notable chemists in the second half of the nineteenth century. As a better understanding of how atoms connected in a molecule began to take shape, Gilbert N. Lewis, in 1916, wrote a seminal publication with a clear picture of the covalent bond structure between two atoms, based on “shared” electrons. The simple illustration of electrons around an atom by “dot” structures provided an easy to understand means to such bonding when the “octet” rule was taken into account. The distribution of such bonding electrons was subsequently modified by more sophisticated probability theories. On the centennial of this publication, this paper will describe the life of G.N. Lewis and the evolution of the concepts of bonding up to his time.

HIST 31 - R.J.P. Williams and the chemical sequence of natural history

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The inorganic chemist R.J.P. Williams (1926-2015) is known best for identifying the Irving-Williams series with Harry Irving in 1953, but Williams is also well known for many contributions to biochemistry. In the final decades of his life, Williams published several books and articles applying the principles of inorganic chemistry (including the Irving-Williams series) to natural history. In these publications, he wrote as a historian telling a narrative of chemical evolution. After the turn of the century, genetic evidence supported many aspects of his synthesis of geochemistry, biochemistry, and inorganic chemistry, culminating in a chemical sequence for the evolution of life on Earth. I have adapted Williams’ historical narrative for a general audience and contrasted it with Stephen Jay Gould’s “Tape of Life” narrative in the new book A World From Dust: How the Periodic Table Shaped Life. Williams developed his narrative by applying his experience as an inorganic chemist and biochemist to four billion years of natural history. Williams’ chemical thinking led to his hypotheses of specific ways in which chemistry constrained the historical possibilities open to biology through chemical availabilities, reactivities, and solubilities. These chemical constraints shaped the trajectory of evolution into a story that can be told to a general audience as an engaging, interdisciplinary narrative of "big history." This narrative shows how the regular organization of the periodic table led to regularities in the chemical sequence of the development of Earth and life, ultimately highlighting the historical explanatory power of the discipline of chemistry.