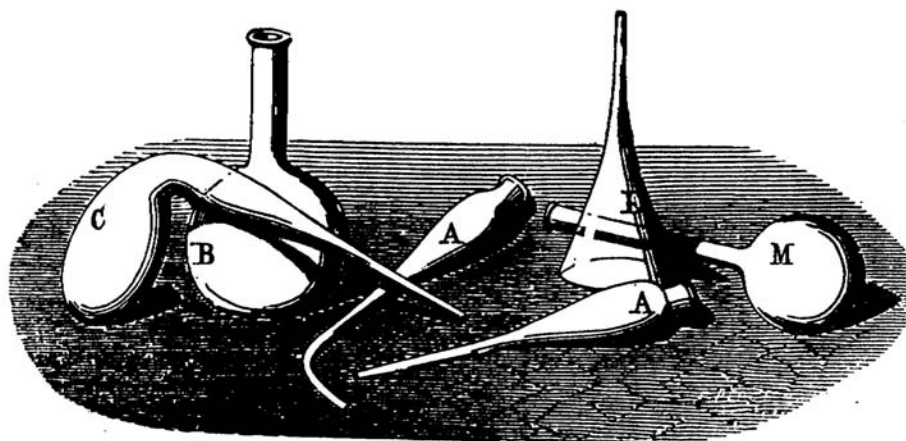




American Chemical Society
**DIVISION OF THE HISTORY OF
CHEMISTRY**



PROGRAM AND ABSTRACTS

241st ACS National Meeting
Anaheim, CA
March 27-31, 2011

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HIST

DIVISION OF THE HISTORY OF CHEMISTRY

Final Program, 241st ACS National Meeting, Anaheim, CA, March 27-31, 2011

S. C. Rasmussen, *Program Chair*

BUSINESS MEETING:
HIST Executive Committee Meeting, 5:00 pm:Sun

SUNDAY AFTERNOON

Disney's Paradise Pier – Redondo

General Papers

S. C. Rasmussen, *Organizer, Presiding*

1:30—Introductory Remarks

1:35—**1.** HIST Tutorial: Early history of metallurgy. **S. C. Rasmussen**

2:15—**2.** Materiapolymérica: Natural rubber. **G. D. Patterson**

2:45—Intermission

3:00—**3.** Chemistry in 1803: A living history outreach. **P. L. Rambo**

3:30—**4.** Edward Teller: Chemist, physicist, “Father of the hydrogen bomb”. **I. Hargittai**

4:00—**5.** Associates of Fred Sanger: Elizabeth Blackburn, Nobel Laureate 2009. **J. S. Jeffers**

MONDAY MORNING

Disney's Paradise Pier – Redondo

Pioneers of Quantum Chemistry

E. Strom, *Organizer, Presiding*

A. Wilson, *Organizer*

Cosponsored by COMP and PHYS

8:55—Introductory Remarks

9:00—**6.** Free-electron model: From Otto Schmidt to John Platt. **W. B. Jensen**

9:30—**7.** George Wheland: Forgotten pioneer of resonance theory. **E. T. Strom**

10:00—**8.** Pioneering quantum chemistry in concert with experiment. **I. Hargittai**

10:30—Intermission

10:45—**9.** Michael J. S. Dewar: Quantum theory for organic chemists. **M. K. Holloway**

11:15—**10.** Molecular Orbital Theory for organic chemists. **A. Streitwieser**

11:45—**11.** H. C. Longuet-Higgins: Contributions to theoretical chemistry. **W. T. Borden**

MONDAY AFTERNOON

Disney's Paradise Pier – Redondo

Pioneers of Quantum Chemistry

E. Strom, *Organizer, Presiding*

A. Wilson, *Organizer*

Cosponsored by COMP and PHYS

1:45— 12.Atoms, molecules and bonds.**K. Ruedenberg**

2:15— 13. John Pople, the man and his science. **J. E. Del Bene**

2:45— 14.History of the Quantum Chemistry Program Exchange (QCPE).**V. V. Mainz**

3:15— Intermission

3:30— 15.Development of the ideas of orbital symmetry control. **R. Hoffmann**

4:00— 16. Golden years at Chicago (LMSS) and San Jose (IBM): Lessons that are relevant today. **P. S. Bagus**

4:30 — 17. Quantum chemistry: 1950 - 1960. **H. F. Schaefer**

MONDAY EVENING

Anaheim Convention Center, Hall B

Sci-Mix

S. C. Rasmussen, *Organizer*

8:00 - 10:00

1. See previous listings.

18. See subsequent listings.

TUESDAY MORNING

Disney's Paradise Pier – Redondo

What's In a Name? Histories of Units and Constants

C. Giunta, *Organizer, Presiding*

Cosponsored by CHED and NTS

8:30— Introductory Remarks

8:35— 18.Avogadro, his hypothesis, and his number.**C. J. Giunta**

9:05— 19.Redefinition of the kilogram and the mole.**P. F. Rusch**

9:35— 20.Faraday and his constant.**G. D. Patterson**

10:05— Intermission

10:20— 21. Radioactivity: Why becquerels? **P. J. Karol**

10:50— 22.Curie and Rutherford - Interplay of personalities and philosophies.**J. L. Marshall**, V. R. Marshall

11:20— 23. SI units on stamps: We've come a long way from fathoms and furlongs, baby! **D. Rabinovich**

TUESDAY AFTERNOON

Disney's Paradise Pier – Redondo

General Papers

S. C. Rasmussen, *Organizer, Presiding*

2:00— Introductory Remarks

2:05— **24.** Immunoassays: A historical perspective. **A. W. Coates**

2:35— **25.** Use of lead and its deadly consequences: A historical perspective. **T. L. Viaene**

3:05— Intermission

3:20— **26.** Chemical and petroleum industries of the Newtown Creek of the late 19th and early 20th centuries. **P. Spellane**, R. Michals

3:50— **27.** Materiapolymérica: Polystyrene. **G. D. Patterson**

Abstracts

HIST 1: HIST Tutorial: Early history of metallurgy

Seth C Rasmussen⁽¹⁾, *seth.rasmussen@ndsu.edu*, NDSU Dept. 2735, P.O. Box 6050, Fargo ND 58108-6050, United States. (1) Department of Chemistry and Biochemistry, North Dakota State University, Fargo ND, United States

It is difficult to think of modern technology without basic metal materials. However, prior to the development of smelting, the only known metallic species were primarily copper, silver, and gold, and even these were somewhat rare. In fact, the very word *Metal* originates from the Greek *metallan*, "to seek after". The extraction of metals from their ores did not begin until ~5,000 BC with the smelting of copper, a landmark moment in history. In contrast, the smelting of iron was a relatively late discovery due to the much higher temperatures required in comparison to that of copper. As a result, the history and technology of early metallurgy is also closely tied to the early history of the furnace and related pyrotechnology. An overview of the early history and chemistry of smelting, metals, and alloys will be presented.

HIST 2: Materiapolymérica: Natural rubber

Gary D Patterson⁽¹⁾, *gp9a@andrew.cmu.edu*, 4400 Fifth Avenue, Pittsburgh PA 15213, United States. (1) Department of Chemistry, Carnegie Mellon University, Pittsburgh PA 15213, United States

One of the most important substances that provided the vision to see forms of matter that could only be understood in terms of macromolecules is natural rubber. Its remarkable properties have been known for millennia. Serious scientific study of the purified tree sap was carried out in the 19th century by Faraday and others. Even in the absence of vulcanization (crosslinking by sulfur), stretched rubber becomes birefringent and shrinks upon rapid heating under tension. The empirical formula was established very soon after such procedures were widely known. Destructive distillation yielded isoprene. The scientific path that led from a view of natural rubber as a colloid formed from isoprene to a macromolecule of polyisoprene will be presented.

HIST 3: Chemistry in 1803: A living history outreach

Patricia L. Rambo⁽¹⁾, *patricia.rambo@mnsu.edu, Ford Hall, Mankato Minnesota 56001, United States. (1) Chemistry, Minnesota State University, Mankato, Mankato Minnesota 56001, United States*

I will describe my outreach efforts at area living history events. These events (called Rendezvous) occur year round in various locations throughout the country, and typically focus on the fur trade era (up to 1840) in the United States. During these events I portray a chemist named Wilhemina Buch, and present chemistry demonstrations to elementary students in a manner that is consistent with the chemistry that was known in the year 1803. I will describe my demonstrations as well as the research efforts into the activities. The challenge of doing chemistry from an 1803 perspective is to talk only about what was known at that time, and not talk about atomic theory, electrons, and elements that were not yet isolated. Additional challenges were acquiring period equipment and doing safe demonstrations while in period dress.

HIST 4: Edward Teller: Chemist, physicist, “Father of the hydrogen bomb”

Istvan Hargittai⁽¹⁾, *istvan.hargittai@gmail.com, P.O. Box 91, Budapest Budapest 1521, Hungary. (1) Hungarian Academy of Sciences and Budapest University of Technology and Economics, Hungary*

Edward Teller was a most influential, controversial, and brilliant scientist.* Some of his contributions to chemistry have proved to be of long-lasting significant, including the determination of the rotation barrier in ethane, the BET equation, and the Jahn–Teller effect. Much of Teller's oeuvre was devoted to the defense of the United States. His contribution to the hydrogen bomb helped secure peace between the superpowers for decades. Other deeds, such as opposition to the nuclear test ban, belittling the consequences of fallout, his role in SDI, and his Machiavellian handling of human interactions greatly damaged his image. Whether by merit or default, he contributed to the victory of democracy and the demise of the Soviet Union.

*I. Hargittai, *Judging Edward Teller: A Closer Look at One of the Most Influential Scientists of the Twentieth Century* (Amherst, NY: Prometheus, 2010)

HIST 5: Associates of Fred Sanger: Elizabeth Blackburn, Nobel Laureate 2009

Joe S. Jeffers⁽¹⁾, *jeffers@obu.edu, 410 Ouachita Street, Box 3786, Arkadelphia AR 71998, United States. (1) Chemistry, Ouachita Baptist University, Arkadelphia AR 71923, United States*

Elizabeth Blackburn shared the 2009 Nobel Prize in Physiology or Medicine "for the discovery of how chromosomes are protected by telomeres and the enzyme telomerase." Elizabeth is the third graduate student of Fred Sanger to be awarded a Nobel Prize. Fred Sanger himself is a two-time Nobel Laureate. The life and work of Elizabeth Blackburn will be presented.

HIST 6: Free-electron model: From Otto Schmidt to John Platt

William B. Jensen⁽¹⁾, *jensenwb@ucmail.uc.edu, ML 0172, Cincinnati OH 45221, United States. (1) Department of Chemistry, University of Cincinnati, Cincinnati OH 45221, United States*

The talk will trace the history of the application of the free-electron model to problems of chemical bonding and spectroscopy from the work of the German chemist, Otto Schmidt, in the late 1930s through that of John Platt and his associates at the University of Chicago in the 1960s. It will also address the issue of the nature and use of radically approximate models in both research and teaching.

HIST 7: George Wheland: Forgotten pioneer of resonance theory

E. Thomas Strom⁽¹⁾, *tomstrom@juno.com*, Box 19065, 700 Planetarium Place, Arlington TX 76019-0065, United States. (1) Department of Chemistry and Biochemistry, University of Texas at Arlington, Arlington TX 76019-0065, United States

George W. Wheland, although little remembered today, is forever linked to resonance theory through three seminal papers in the '30's coauthored with Linus Pauling and through his magisterial 1955 monograph "Resonance in Organic Chemistry." At Chicago Wheland carried out research on acids and bases while continuing to publish papers on resonance. Sadly, his scientific career ended long before his death because of his contracting neurological disease. This paper gives an overview of his career with emphasis on his influence on resonance theory.

HIST 8: Pioneering quantum chemistry in concert with experiment

Istvan Hargittai⁽¹⁾, *istvan.hargittai@gmail.com*, POBox 91, Budapest Budapest, Hungary. (1) Hungarian Acad. of Sci. and Budapest Univ. of Tech. and Economics, Budapest, Hungary

Computation and experiment perform best when they act in concert, and the quantum chemistry pioneers kept this in mind from the beginning. Linus Pauling discussed theory and experimental information in a concerted way. He deduced from theory that the peptide bond should be planar. The theory of resonance went through bumpy periods in the Soviet Union in the early 1950s and its proponents were made to suffer for their ostensibly succumbing to foreign decadent ideologies. For a while there was a great battle between the more eloquent VB and the more useful MO approaches. Charles Coulson showed the way to shift toward MO theory and applications. Thanks to John Pople, quantum chemistry has become an integral part of chemical research. He pointed the way to estimating the "experimental error" of calculations thus developing quantum chemistry computations to be an equal partner in the realm of all "physical" techniques.

HIST 9: Michael J. S. Dewar: Quantum theory for organic chemists

M. Katharine Holloway⁽¹⁾, *kate_holloway@merck.com*, Bldg. 53F-301, West Point PA 19486, United States. (1) Department of Chemistry, Modeling, and Informatics, Merck Research Laboratories, West Point PA 19486, United States

Michael J. S. Dewar was one of the first organic chemists to apply quantum theory to organic chemistry problems. His studies in quantum chemistry under Charles Coulson and subsequent work with Robert Robinson, a famous organic chemist, rendered him uniquely qualified for this role.

While still a post-doctoral fellow at Oxford in 1945, he deduced the correct structure for stipitatic acid, which included the first 7-membered aromatic ring system for which he coined the term tropolone. In 1949, as a young professor at Queen Mary College, he published a revolutionary book, *The Electronic Theory of Organic Chemistry*, that attempted to introduce physical organic chemists to molecular orbital ideas. And in 1952, more than 10 years before the Woodward-Hoffman rules, he published a seminal series of six back-to-back papers in the Journal of the American Chemical Society which made the case for the use of molecular orbital, rather than resonance theory, arguments in the understanding of standard organic chemistry reactions. He is well-remembered for his vigorous debate on the mechanistic details of cycloaddition reactions and the structures of carbenium ions. However, Dewar is perhaps best known for his development in the '70s and '80s of the semi-empirical MO methods MINDO/3, MNDO, and AM1, which enabled quantitative molecular orbital computations on large organic molecules, including novel ions, organic reaction mechanisms, and even enzyme catalysis.

In addition to his professional achievements, Dewar was a splendid conversationalist who often espoused rather unorthodox views in order to stimulate discussion. He was also a wonderful storyteller and a

legendary host, along with his wife Mary (an English Tudor historian). He had many diverse interests outside of chemistry, from astronomy and geology to oriental cooking and science fiction novels.

HIST 10: Molecular Orbital Theory for organic chemists

Andrew Streitwieser⁽¹⁾, *astreit@berkeley.edu, Dept of Chemistry, Berkeley CA 94720-1460, United States. (1) Department of Chemistry, University of California, Berkeley CA 94720-1460, United States*

In 1931 Erich Hückel published his treatment of benzene with a method now generally referred to as the Hückel MO (HMO) method. He showed how cyclic arrays of 2, 6 and 10 π -electrons form closed shells that provide enhanced stability. By the middle thirties he had applied his approach to other aspects of organic chemistry but thereafter did no further original work. Extensive theoretical and experimental work on his concepts was done by others. "Molecular Orbital Theory for Organic Chemists" was written a quarter century later and documented brilliant syntheses of new "4n+2" molecules as well as numerous applications of HMO theory to redox processes, aromatic substitution, carbocation and carbanion reactions, rearrangements, as well as "Frontier Orbital" perturbation approaches. The era reviewed was predominantly the chemistry of π -electrons but was followed shortly by various treatments of σ -electrons in what can now be recognized as the next era of quantum chemistry.

HIST 11: H. C. Longuet-Higgins: Contributions to theoretical chemistry

Weston T Borden⁽¹⁾, *borden@unt.edu, 1155 Union Circle #305070, Denton Texas 76203-5017, United States. (1) University of North Texas, United States*

During the quarter of a century between the publication in 1943 of H. C. Longuet-Higgins' paper, "The structure of the boron hydrides" (written when he was still an Oxford undergraduate), until he left chemistry in 1967 (to cofound the Department of Machine Intelligence and Perception at the University of Edinburgh), H. C. Longuet-Higgins was one of the world's most creative and insightful theoretical chemists. This lecture will describe some of the many contributions made by H. C. Longuet-Higgins to theoretical chemistry.

HIST 12: Atoms, molecules and bonds

Klaus Ruedenberg⁽¹⁾, *ruedenberg@iastate.edu, Osborn Drive, Ames Iowa 50011, United States. (1) Department of Chemistry and Ames Laboratory USDOE, Iowa State University, Ames Iowa 50011, United States*

Over the last two centuries, the concept of the atom has undergone significant modifications: from the hard corpuscle whose motions yield the gas pressure, to a thought model for explaining chemical reactions and properties, to the planetary orbits and then the standing waves of electrons around isolated nuclei and, finally, to the as yet poorly-understood wave mechanical electronic substructures that form around nuclei within molecules. Correspondingly challenging has been the elucidation of chemical bonding beyond numerical calculations. Understanding its physical *origin* is difficult due to the kinetic energy operating differently in wave mechanics than in classical mechanics. Unraveling the great *variety* of bonding interactions and their mixtures is difficult because it requires complex molecular energy analyses to identify *intrinsic* features that are transferable as well as interpretable. The quest for the wave mechanical understanding of atoms and bonds in molecules that was begun by R.S. Mulliken is still ongoing.

HIST 13: John Pople, the man and his science

Janet E. Del Bene⁽¹⁾, jedelbene@ysu.edu, 116 Pinehurst Drive, SE, Warren Ohio 44484, United States. (1) Department of Chemistry, Youngstown State University, Youngstown Ohio 44555, United States

Sir John A. Pople was the dominant theorist of the second half of the twentieth century. He and his work were given the ultimate recognition in 1998 when John was awarded the Nobel Prize in Chemistry. This talk will briefly outline his biography, but will focus primarily on his science as viewed through the eyes of his students and research collaborators.

HIST 14: History of the Quantum Chemistry Program Exchange (QCPE)

Vera V Mainz⁽¹⁾, mainz@illinois.edu, 142B RAL, Box 34 Noyes, 600 S. Mathews Ave., Urbana IL 61801, United States. (1) School of Chemical Sciences, University of Illinois at Urbana-Champaign, Urbana IL 61802, United States

The Quantum Chemistry Program Exchange was formed in 1962 at Indiana University to distribute quantum chemistry codes. It is no longer active. This was a unique source for access to hundreds of computational chemistry/physics programs. The author will attempt to present a short history of this valuable resource.

HIST 15: Development of the ideas of orbital symmetry control

Roald Hoffmann⁽¹⁾, rh34@cornell.edu, Cornell University, Baker Lab, Ithaca NY, United States. (1) Cornell University, United States

A personal account will be given of my work with RB Woodward from 1964-1969 on the role of molecular orbitals in controlling the course of chemical reactions, the complex of ideas now known as the Woodward-Hoffmann rules.

HIST 16: Golden years at Chicago (LMSS) and San Jose (IBM): Lessons that are relevant today

Paul S. Bagus⁽¹⁾, bagus@unt.edu, 1155 Union Circle #305070, Denton Texas 76203-5017, United States. (1) Department of Chemistry, University of North Texas, Denton Texas 76203-5017, United States

Presentations at the 1959 Boulder conference on Molecular Quantum Mechanics showed the potential of rigorous non-empirical, *ab initio*, quantum chemical calculations to address and solve chemical problems. About 25% of the papers in the conference proceedings, published in Reviews of Modern Physics, were contributions from the Laboratory of Molecular Structure and Spectra, LMSS, directed by Roothaan and Mulliken, at the University of Chicago. During the 1960's several people from LMSS moved to Clementi's department at the IBM Research Laboratory in San Jose, California to continue the development and application of programs for the calculation of Hartree-Fock and correlated wavefunctions. Because of limitations of available computers calculations often had to be individually designed to contain the correct chemistry and still be computationally feasible. A selection of work from LMSS and IBM San Jose, whose ideas and concepts are relevant to the way we use and understand calculations today, will be reviewed.

HIST 17: Quantum chemistry: 1950 - 1960

Henry F. Schaefer⁽¹⁾, fri@uga.edu, 1004 Cedar Street, Athens GA 30602, United States. (1) Center for Computational Chemistry, University of Georgia, Athens GA 30602, United States

Although *ab initio* computational quantum chemistry produced virtually no predictions of chemical interest during the 1950's, an important foundation for future work was laid during this decade. Much of this fundamental computational research was carried out in the laboratories of Frank Boys in Cambridge

(England) and Clemens Roothaan and Robert Mulliken in Chicago. Other senior contributors to *ab initio* chemical theory during this period include Klaus Ruedenberg, Robert Parr, John Pople, Robert Nesbet, Harrison Shull, Per-Olov Löwdin, Isaiah Shavitt, Albert Matsen, Douglas McLean, and Bernard Ransil.

HIST 18: Avogadro, his hypothesis, and his number

Carmen J Giunta⁽¹⁾, *giunta@lemoyne.edu*, 1419 Salt Springs Rd., Syracuse NY 13214-1399, United States.
(1) Department of Chemistry and Physics, Le Moyne College, Syracuse NY 13214-1399, United States

In 1811, Amedeo Avogadro published a proposal that reconciled John Dalton's atomic theory with Joseph-Louis Gay-Lussac's observations about the combining volumes of gases. Although Avogadro was not alone in this insight, his proposal did not win widespread acceptance for several decades. Today we call this hypothesis Avogadro's law, that equal volumes of gases under the same temperature and pressure contain equal numbers of molecules. Avogadro never had any idea of what that number is, but the number of fundamental entities in the SI base unit mole is now named after him. This presentation will touch on Avogadro's life, his hypothesis, and the constant named after him.

HIST 19: Redefinition of the kilogram and the mole

Peter F. Rusch⁽¹⁾, *PFRusch@aol.com*, 162 Holland Court, Mountain View CA 94040, United States. (1) Department of Chemical Information, Rusch Consulting Group, United States

The Avogadro constant permits chemists to connect the microscopic atomic world to the macroscopic world of the laboratory through the current definition of the mole relating mass to a number of entities. Proposed redefinitions of the kilogram and the mole and what they mean to the practice of chemistry will be reviewed.

HIST 20: Faraday and his constant

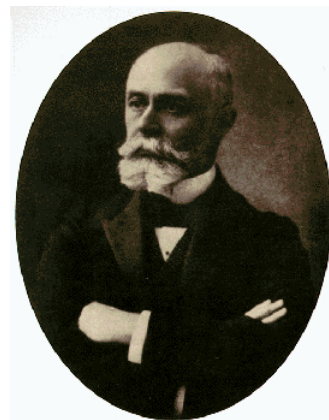
Gary D Patterson⁽¹⁾, *gp9a@andrew.cmu.edu*, 4400 Fifth Avenue, Pittsburgh PA 15213, United States. (1) Department of Chemistry, Carnegie Mellon University, Pittsburgh PA 15213, United States

Studies at the Royal Institution established that Chemistry was inherently electrical in nature. Substances could be modified by subjecting them to electric current. What Davy initiated, Faraday completed. Faraday's Law of electrolysis established that there was a linear relationship between the mass of substance liberated by electrolysis and the amount of current that flowed. The constant of proportionality depends on the electric charge per mole of electrons, called the Faraday constant: $F=96485.3399 \text{ C mol}^{-1}$. The present paper will follow the details of Faraday's original research and trace how this fundamental finding was translated into a universally recognized constant of Chemistry. Full circle was achieved by Jean Perrin who showed that the Faraday constant is equal to the charge on a single electron (measured by himself and J.J.Thomson) times the Avogadro number (one of Perrin's lifelong passions).

HIST 21: Radioactivity: Why becquerels?

Paul J Karol⁽¹⁾, *pk03@andrew.cmu.edu*, Chemistry Department, Carnegie Mellon University, 4400 Fifth Avenue, Pittsburgh PA 15213, United States.
(1) Department of Chemistry, Carnegie Mellon University, Pittsburgh PA 15213, United States

The phenomenon of radioactive decay was discovered in the second half of the nineteenth century. With a migration to the SI system in the second half of the twentieth century, the unit for radioactive decay rate was cast as *becquerels* for “reasons of human safety”. I will retrace the trail of events leading up to the discovery of radioactivity and the intriguing role of Henri



Becquerel's scientific family in this fascinating and influential spectacle of nature.

HIST 22: Curie and Rutherford - Interplay of personalities and philosophies

James L Marshall⁽¹⁾, jimm@unt.edu, 1155 Union Circle, Denton TX 76203-5017, United States; Virginia R Marshall⁽¹⁾. (1) Department of Chemistry, University of North Texas, Denton TX 76203, United States

The rutherford and the curie are two units measuring radioactive decay, named for Ernest Rutherford (1871-1937) and Marie Curie (1867-1934), whose investigative work, perhaps above all others, elucidated the nature of this phenomenon. In this presentation a historical account will be made of the interplay and evolution of the differing scientific thinking of scientists in Great Britain and on the Continent, as exemplified by the research of these two scientists and their colleagues, as an understanding of radioactivity matured in the first quarter of the twentieth century.

HIST 23: SI units on stamps: We've come a long way from fathoms and furlongs, baby!

Daniel Rabinovich⁽¹⁾, drabinov@uncc.edu, 9201 University City Boulevard, Charlotte North Carolina 28223, United States. (1) Department of Chemistry, The University of North Carolina at Charlotte, Charlotte North Carolina 28223, United States

The International System of Units (SI) is the most widely used array of units of measurement and is internationally recognized as the standard metric system. Playing a key role in commerce and science, it relies on the use of seven base units (meter, kilogram, second, ampere, kelvin, mole, candela) that are often associated with prefixes to indicate multiples or submultiples of a given quantity. This presentation will feature some highlights of the history of the development of the International System of Units, as illustrated on postage stamps and other postal matter. Philatelic vignettes of a number of derived SI units (newton, hertz, coulomb, volt, tesla, etc.) and their scientific namesakes will also be included in this presentation.



HIST 24: Immunoassays: A historical perspective

Andrew W Coates⁽¹⁾, awcoates@ucdavis.edu, One Shields Ave, Davis California 95616, United States. (1) Environmental Toxicology, University of California, Davis, Davis CA 95616, United States

Many fondly remember the 1950s for poodle skirts, chocolate malts, and Adlai Stevenson's numerous runs for the Presidency. However, another fashionable trend at this time was the immunoassay, the highly useful and adaptive technique for bioanalysis. It was at this time that Rosalyn Yalow and Solomon Berson started their groundbreaking work in immunoassay. For this work they were awarded the Nobel Prize in the 1970s, garnering the headline referring to Yalow, "She Cooks! She Cleans! She Wins the Nobel Prize!" This is just one example of the relevance of immunoassay throughout history. From the turn of century to the culmination of biotechnology and the rise of nanotechnology, immunoassay has played a significant role in scientific understanding and is still growing strong today. As such, this presentation will analyze immunoassay through a historical perspective. Over the years, immunoassay has earned much international esteem and this nostalgic look at the history of immunoassay is sure to be a great way to celebrate the International Year of Chemistry.

HIST 25: Use of lead and its deadly consequences: A historical perspective

Tajae L. Viaene⁽¹⁾, *tajae.l.viaene@ndsu.edu*, NDSU Dept 2735, P.O. Box 6050, Fargo ND, United States. (1) North Dakota State University, United States

Lead is one of the earliest metals known to man and its uses throughout history are vast. Lead has been an additive in household products such as cosmetics, paints, and pottery. Interestingly, the latin word for lead, *plumbum*, has coined the word “plumbing” because of the use of lead in the vast network of pipelines that kept the cities of the Roman Empire supplied with water. From its uses in alchemy, to additives in food and wine by the Romans, and the content of lead in gasoline, lead has had significant impact on society. Today, knowledge of the toxic effects of lead ingestion have led to a number of changes such as its removal in household paints and products, along with the implementation of unleaded fuel in automobiles. A historical survey of the uses and toxicity of lead will be discussed.

HIST 26: Chemical and petroleum industries of the Newtown Creek of the late 19th and early 20th centuries

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The Newtown Creek, a channel-like body of water located near the center of New York City, became in the 19th century one of the most important petroleum refining and chemical production sites in the US. In this talk, we employ period maps, photographs, and accounts of then-current technical and business practices to inform descriptions of the chemical technologies practiced along the Newtown Creek and the technical and environmental impact of these practices. In September 2010, The U.S. Environmental Protection Agency (EPA) added Newtown Creek to its Superfund National Priorities List of the country's most hazardous waste sites. This talk will focus on several significant technologies practiced at the Newtown Creek from 1870 through the mid-20th century and emphasize the technical and commercial interactions between industrial entities along the Creek. These technical and commercial realities provide background for understanding the recent EPA NPL designation.

HIST 27: Materiapolymérica: Polystyrene

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Tree sap has provided humankind with interesting materials from antiquity. Storax resin was widely available in the 19th century. It was noticed that it spontaneously resinified under heating. Early experiments by Berthelot examined the “polymerization” of the active ingredient in Storax resin: styrene. As the theory of chemical structure developed, there was an effort to place styrene within its proper chemical context. The present paper will trace the history of the conceptualization of the resinification of styrene. It will also present the history of the concepts necessary to understand polystyrene as a stereotactic molecule. The geometric description and understanding of polystyrene conformation will also be followed. All these concepts were extant long before polymer science was a coherent field of study.