American Chemical Society
Division of the History of Chemistry

Program and Abstracts

240th ACS National Meeting
Boston, MA
August 22-26, 2010

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HIST

DIVISION OF THE HISTORY OF CHEMISTRY

Final Program, 240th ACS National Meeting, Boston, MA, August 22-26, 2010

S. C. Rasmussen, *Program Chair*

SUNDAY AFTERNOON

Seaport Hotel – Flagship A

General Papers

S. C. Rasmussen, *Organizer, Presiding*

1:30 — 1. On the trail of a Thomas Thomson work published in Philadelphia. **B. Charton**

2:00 — 2. Charles Darwin and chemistry. **M. Saltzman**
2:30 — 3. Dawn of biological activity prediction. **M. Charton**
3:00 — Intermission.
3:15 — 4. Did John Frederick William Herschel discover molecular chirality before Louis Pasteur? **J. Gal**
3:45 — 5. Robert L. Alldredge, Chemical Engineer, Inventor, Entrepreneur, Developer of Octolig®. **D. Martin**
4:15 — 6. Hydrogen to Copernicium: An elemental history of the periodic table. **D. Rabinovich**

MONDAY MORNING

Seaport Hotel – Constitution

Anna Jane Harrison: ACS President, Her Science and Her Legacy

J. Hayes, *Organizer, Presiding*

8:15 — Introductory Remarks.
8:25 — 7. Anna J. Harrison: Teacher and leader. **L. P. Eubanks**
8:55 — 8. Anna Jane Harrison at Mount Holyoke College. **M. Campbell**
9:25 — 9. From Toxic Smoke to the Structure and Reactions of Organic Compounds; the Chemical Research of Anna Jane Harrison. **J. Hayes**
9:55 — Intermission.
10:15 — 10. Anna Jane Harrison: First Woman Elected as ACS President. **H. Free**
10:45 — 11. Anna Jane Harrison: Policy Leader. **M. Good**
11:15 — 12. Anna Jane Harrison from Afar. **M. Singleton**
11:45 — Panel Discussion

MONDAY AFTERNOON

Seaport Hotel – Constitution

Classic Books in Chemistry VII: Physical Chemistry Books from New England

N. Heindel, *Organizer*
G. Patterson, *Organizer, Presiding*

1:30 — 13. Physical chemistry before Ostwald; The textbooks of Josiah Parsons Cooke. **W. Jensen**
2:10 — 14. Henry Adams and the application of thermodynamics to history. **R. Egolf**
2:40 — 15. Measures of the spread: The influence of statistics on J. Willard Gibbs and the influence of Gibbs on statistics. **C. Cobb**
3:10 — Intermission.
3:30 — 16. Richards the First. **P. Karol**
4:00 — 17. "Chemical Thermodynamics", by Kirkwood and Oppenheim. **T. Keyes**
4:30 — 18. MIT and the Physical Chemistry Laboratory: Charles Kraus and "The Properties of Electrically Conducting Systems". **G. Patterson**

MONDAY EVENING

Hall D Exhibit Hall C, BCEC

Sci-Mix

S. C. Rasmussen, *Organizer*

8:00 - 10:00
14. See previous listings.

Abstracts

HIST 1: On the trail of a Thomas Thomson work published in Philadelphia

***Barbara Charton**, bc33@nyu.edu, 200 Willoughby Avenue, ARC, Brooklyn, New York NY 11205. Department of Mathematics and Science, Pratt Institute, Brooklyn, New York NY 11205, United States*

Thomas Thomson is a famous name in the history of chemistry. His first major work appeared in the 2-volume Supplement to the Encyclopedia Britannica's 3rd edition. Building on and expanding this work, Thomson produced his single volume "A New System of Chemistry..." in Edinburgh in 1802. However, the Philadelphia publisher Thomas Dobson produced a volume entitled "A New System of Chemistry comprehending the Latest Discoveries..." in 1800. Dobson was a well-established publisher of scientific, medical and technical books. While this was an important publishing house it was certainly not the only one; there was significant interest in science and technology early in American history. But what was this volume?

HIST 2: Charles Darwin and chemistry

***Martin D Saltzman**, msaltzmn@providence.edu, 1 Cunningham Square, Providence RI 02918, United States .*

Charles Darwin (1809-1882) is always associated with the development of modern biological thinking through his theory of the origin of species through means of natural selection. However it is little appreciated that Darwin during his formative years had an interest in chemistry that if it was nurtured could have entirely changed the trajectory of his career. In this presentation I will try to present the chemistry that the young Darwin was exposed to during his student days at Edinburgh and Cambridge. At Edinburgh he attended the lectures of Thomas Charles Hope(1766-1844) and at Cambridge James Cumming (1777-1861). Reasons for Darwin's loss of interest in chemistry will be discussed in the context of the state of chemical education and research in Great Britain during the first three decades of the nineteenth century. Darwin would maintain an interest in chemistry and call upon chemists when it was helpful to his work in natural history. From the Darwin correspondence that has been published by Cambridge University I will discuss certain items that show this.

HIST 3: Dawn of biological activity prediction

***Marvin Charton**, mchartongm@gmail.com, 200 Willoughby Avenue, Brooklyn, New York NY 11205, United States. Department of Mathematics and Science, Pratt Institute, Brooklyn, New York NY 11205, United States*

One of the major occupations of modern chemistry is the prediction of biological activity. Such predictions are useful for the design of bioactive molecules such as medicinal drugs and pesticides, and in the identification of potentially toxic chemicals for environmental purposes. From a historical viewpoint it is necessary to start with the development of the theory of chemical structure. The earliest characterization of chemical substances was by composition. A complication was introduced by the discovery of isomerism. Not surprisingly, the earliest attempts at bioactivity prediction were based on this. The earliest effort to study relationships between composition and bioactivity and between bioactivity and a physical property of a chemical substance as well is due to James Blake. Blake who trained as a physician was active between 1837 and 1885. he studied the toxicity of metalllic salts in dogs. In 1819 Mitscherlich discovered the existence of isomorphism in crystals of inorganic salts. In 1841 Blake found a qualitative relationship between toxicity and isomorphism in these compounds. Further studies were carried out and he summarized his results in 1873[1]. In the Proceedings of the American Association for the Advancement of

Science for 1850 E.N. Horsford reported a relationship between composition and taste for a number of compounds[2]. Thus these authors appear to have been the first to look for a qualitative relationship between chemical constitution and a biological property.

1. J. Blake, Amer.J.Sci.Arts. **7,** 39 (1874)
2. E.N. Horsford, Amer.J.Sci.Arts 2nd Series.**XII,** 195-199 (1851)

HIST 4: Did John Frederick William Herschel discover molecular chirality before Louis Pasteur?

Joseph Gal*, joe.gal@ucdenver.edu, Aurora Colorado 80045.Division of Clinical Pharmacology, University of Colorado School of Medicine, Aurora Colorado 80045, United States*

Louis Pasteur is universally credited with the discovery of molecular chirality in 1848, but such accounts ignore earlier inferences by John Herschel, a British astronomer, physicist, and chemist. In 1822 Herschel wrote the following on Biot's observations of optical rotation by certain substances in the liquid or gas phase or in solution: "[T]he general impression left on our minds is that of a want of symmetry in the disposition within the molecules themselves, of some of the elementary forces by which they act on light." In 1827 Herschel further elaborated: "[T]o produce such phenomena, each individual molecule must be conceived as unsymmetrically constituted, *i.e.*, as having a right and left side." These statements no doubt constitute a basic formulation of molecular chirality, and Pasteur was probably aware of them. However, Herschel's suggestions remained theoretical speculations, and it was Pasteur's monumental experimental work that established the existence of chiral molecules.

HIST 5: Robert L. Alldredge, chemical engineer, inventor, entrepreneur, developer of Octolig®

Dean F. Martin*, dmartin@cas.usf.edu, CHE 205, 4202 East Fowler Avenue, Tampa Florida 33620, United States. Department of Chemistry, University of South Florida, Tampa Florida 33620, United States*

Robert L. Alldredge (1922-2008) developed a life-long interest in chemistry that was strongly influenced by his father, a high school chemistry teacher. He entered the University of Denver at 16, and upon graduation worked as a chemical engineer for DuPont for a year before being drafted by the Army. He was sent to Los Alamos where he was part of the team that developed a detonation system for the atomic bomb. Subsequently, he and his wife settled in the Denver area, where they raised a family, and where he set up three businesses over the years. He was an active inventor with some 60 patents, US and foreign, to his credit. One product that he developed through Metre-General, Inc. was Octolig®, a polyamine ligand covalently attached to a high-surface- area silica. In his later years, we had the chance to collaborate on novel uses of Octolig®.

HIST 6: Hydrogen to Copernicium: An elemental history of the periodic table

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

This presentation will feature some highlights of the history of the periodic table and the discovery of several elements, as illustrated on postage stamps and related philatelic materials. From alchemy to nuclear fission, a surprisingly large number of postage stamps show various aspects of the history of chemistry and its main characters and accomplishments, and thus constitute an inexpensive and engaging way of communicating science to a general audience. Since the International Year of Chemistry (2011) is just a

few months away, a few recent (and even some yet-to-be released) stamps related to chemistry will be shown as a tribute to the “central science”.

HIST 7: Anna J. Harrison: Teacher and leader

***Lucy P. Eubanks**, elucy@clemson.edu, Department of Chemistry, Clemson University, Clemson SC 29634, United States*

Anna Harrison was my freshman chemistry teacher at Mount Holyoke College. I knew at the time that she was a knowledgeable and effective teacher, reaffirming my decision to choose this liberal arts college for pursuing a major in chemistry. However, I had little idea how Anna would come to affect the rest of my professional life as a chemistry educator, author, and active member of ACS.This paper will detail some of the ways in which her influence has expanded my networks and enriched my understanding of the relationships among science and society. Along the way, I've also learned about some surprising aspects of her early life, both back in Missouri and in her chemistry career.

HIST 8: Anna Jane Harrison at Mount Holyoke College

***Mary Campbell**, mcampbel@mtholyoke.edu, Mount Holyoke College, Tucson AR 85718, United States*

Dr. Anna Jane Harrison began teaching and research at Mount Holyoke College in 1945. She became a full professor in 1950, served as chair of the Chemistry Department from 1960-69, and retired in 1979. This presentation will explore her experiences and her legacy at Mount Holyoke.

HIST 9: From toxic smoke to the structure and reactions of organic compounds: The chemical research of Anna Jane Harrison

***Janan M. Hayes**, jmhayes@earthlink.net, Retired, Merced College, Sacramento CA 95842, United States*

Dr. Anna Jane Harrison began her career teaching at Sophie Newcomb College during World War II. At the same time, she did research on toxic smoke culminating with the American Ceramic Society honoring her for this research. In 1950 she moved to Mount Holyoke College. In addition to her noted work in chemical education, she did research concerning the structure of organic molecules, the absorption of organic compounds in ultraviolet and far ultraviolet regions, and photolysis. Often her published research was co-authored with her students and fellow chemists at Mount Holyoke.

HIST 10: Anna Jane Harrison: First woman elected as ACS President

***Helen M. Free**, Hmfree23@aol.com, 3752 E Jackson Blvd, Elkhardt IN 46516, United States; Janan M Hayes, Merced College, Sacramento CA 95842, United States*

Anna Jane Harrison is a pioneer example in the chemical sciences, working as an educator and researcher, and actively serving her discipline in a number of various organizations. Harrison was the 93rd person and first woman to be elected as 1978 ACS President. As such, she had three major goals: (1) to develop ACS's ability to constructively interact with various regulatory agencies, (2) to develop programs at the high school, college and university level aimed at the general or non-science major student, and (3) to expand the self-image of the roles that are appropriate and honorable for professional chemists. In this presentation, Harrison's accomplishments as ACS president will be discussed as well as some of her impact as past ACS president.

HIST 11: Anna Jane Harrison: Policy leader

***Mary L. Good**, mlgood@ualr.edu, Donaghey College, University of Arkansas at Little Rock, Little Rock AK 72204, United States; Margaret A. Cavanaugh, Directorate for Geosciences, National Science Foundation, Arlington VA 22230, United States*

After her service on the ACS Board of Directors and as President of the Society, Dr. Anna J. Harrison continued as a member of the Council of the ACS for over 20 years. She was elected president of AAAS in 1983-84. In addition, she was active in leadership of Sigma Xi and of the U.S. National Committee of IUPAC. These major roles of service to society were very important to the scientific enterprise and her influence on professional and governmental policies is still felt.

HIST 12: Anna Jane Harrison from afar

***Mary F. Singleton**, maryhas@juno.com, Women Chemists Committee, Central New Mexico Section - ACS, Cordova NM 87523, United States*

A look at Anna Jane Harrison from the perspective of one of her admirers who did not know her personally and was never one of her students. She served as an iconic figure and an inspiration even from afar to women who entered the chemistry professions prior to the 1970s.

HIST 13: Physical chemistry before Ostwald: The textbooks of Josiah Parsons Cooke

***William B. Jensen**, jensenwb@ucmail.uc.edu, Chemistry, University of Cincinnati, Cincinnati Ohio 45221, United States*

The usual story is that the discipline of physical chemistry was born of the efforts of the German chemist Wilhelm Ostwald in the 1880s. In fact there were at least two earlier traditions of theoretical chemistry textbooks which preceded those of Ostwald and his students by at least three decades. The talk will review these earlier traditions as exemplified in the textbooks of the Harvard chemist Josiah Parsons Cooke.

HIST 14: Henry Adams and the application of thermodynamics to history

***Roger A. Egolf**, rae4@psu.edu, Department of Chemistry, Pennsylvania State University - Lehigh Valley Campus, Center Valley PA 18034, United States ; Peter A. Khoury, Department of Chemistry, Pennsylvania State University - Lehigh Valley Campus, Center Valley PA 18034, United States*

The topic of this symposium is the history of physical chemistry books written by authors from New England. This paper turns this topic on its ear by looking at a few essays written by a prominent New Englander which applied physical chemistry to history. In the late 19^{th} and early 20^{th} centuries, social sciences ranging from psychology and economics to political science began to attempt to apply the methods of the natural sciences to their problems with much apparent success. In this intellectual atmosphere, more than a few historians became enamored with the idea that they could use the methods of physics and biology to turn their field into a predictive science. Henry Adams, an author, editor, world traveler, former history professor at Harvard, and descendent of two American presidents, wrote several long essays in which he attempted to apply entropy and Gibb's phase rule to historical processes. There is much controversy whether Adams truly believed in the ideas he proposed, or if he might have been playing a joke on his historian peers. This paper will discuss the ideas he presented in his essays “A letter to American Teachers of History” and “The Rule of Phase Applied to History”.

HIST 15: Measures of the spread: The influence of statistics on J. Willard Gibbs and the influence of Gibbs on statistics

***Cathy Cobb**, cobbfetterolf@gforcecable.com, Aiken Preparatory School, Aiken South Carolina 29801-6901, United States*

As chemists, we tend to claim J. Willard Gibbs as our own. Is he not, after all, the father of physical chemistry? It seems, however, that several disciplines can trace their lineage through Willard Gibbs. This presentation will offer a brief history of the field of statistics up to the time of J. Willard Gibbs, explore Gibbs's masterful use of statistics to establish the theoretical foundations of chemical thermodynamics, and then investigate how fields as diverse as economics, evolutionary biology, and literature have adapted and profited from the mathematics of J. Willard Gibbs.

HIST 16: Richards the First

***Paul J Karol**, pk03@andrew.cmu.edu, Department of Chemistry, Carnegie Mellon University, Pittsburgh Pennsylvania 15213, United States*

Theodore William Richards received the Nobel Prize in Chemistry - the first American so recognized - in 1914 for his careful measurements of atomic weights. Richards attended Haverford College and then Harvard. He received his Ph.D. in 1888 with Josiah Cooke and subsequently studied with Ostwald and Nernst. Richards published prolifically on precision analysis, and thermodynamics, often in collaboration with the Carnegie Institution in Washington. I will review “Determinations of Atomic Weights” and “Fundamental Properties of the Elements”.

HIST 17: "Chemical Thermodynamics", by Kirkwood and Oppenheim

***Tom Keyes**, keyes@bu.edu, Department of Chemistry, Boston University, Boston MA 02215, United States*

John G. Kirkwood, who spent most of his career at Yale University, had an enormous influence on the development of statistical mechanics in the USA, both through his own ideas and through the extraordinary number and accomplishments of his students. "Chemical Thermodynamics", by Kirkwood and Oppenheim, is based upon notes from Kirkwood's graduate course, by Irwin Oppenheim, Martin Karplus and Alex Rich. The result is a clear, consistent, and sometimes novel approach that has been an important component of the graduate education of theoretical chemists since publication in 1961. The notable features of "Chemical Thermodynamics" will be discussed, including a focus on measurable quantities throughout, a derivation of the second law incorporating Caratheodory's principle as a consequence of the physical statement of Kelvin and Clausius, the conditions for equilibrium and stability, and the rigorous thermodynamics of systems in electromagnetic fields as applied to electrochemical systems.

HIST 18: MIT and the physical chemistry laboratory: Charles Kraus and "The Properties of Electrically Conducting Systems"

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

New England produced many communities of physical chemists that led to significant books. MIT is noted for the Laboratory of Physical Chemistry founded by A.A. Noyes. One of the most notable books that issued from work at this laboratory was written at the invitation of Noyes by Charles A. Kraus: “The Properties of Electrically Conducting Systems.” It appeared in 1922 as Number 7 in the famous series of ACS Monographs(before the existence of the Debye-Huckel theory). It exhaustively reviewed the available data for both conductivity and ionic equilibrium in electrolyte solutions. It also surveyed the available theories and concluded that no successful theory yet existed. The present paper will discuss the book in its context as a representative work from MIT and as a contribution to the paradigm of electrolyte solutions.