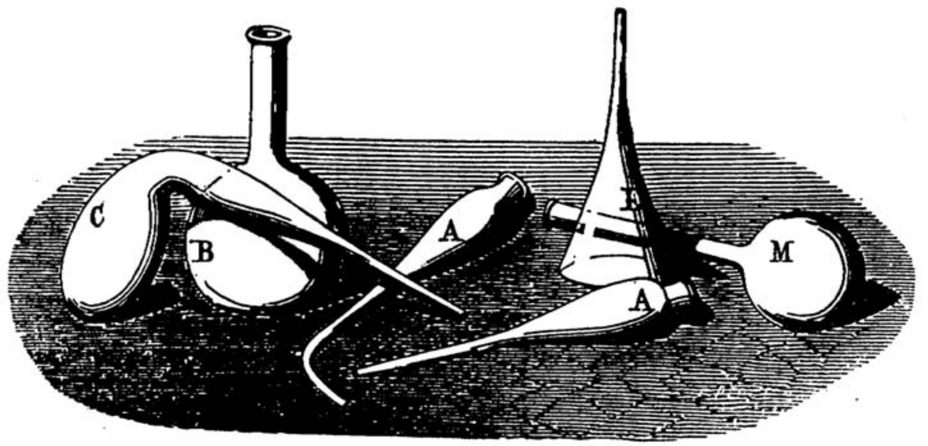
American Chemical Society

DIVISION OF THE HISTORY OF CHEMISTRY



PROGRAM AND ABSTRACTS

243rd ACS National Meeting
San Diego, CA
March 25 - 29, 2012

S. C. Rasmussen, Program Chair

DIVISION OF THE HISTORY OF CHEMISTRY

Chair: E. Thomas Strom
Department of Chemistry and Biochemistry
University of Texas at Arlington
P. O. Box 19065
Arlington, TX 76019-0065
Phone: (817) 272-5441
Fax: (817) 272-3808
Email: tomstrom@juno.com

Chair-Elect: Ned D. Heindel
Lehigh University
Department of Chemistry
Seeley G. Mudd Lab
Bethlehem, PA. 18015
Phone: (610) 758-3464
Fax: (610) 758-3461
Email: ndh0@lehigh.edu

Past Chair: Janan M. Hayes
Merced College (retired)
6829 Barbara Lee Circle
Sacramento, CA 95842
Phone: (916) 331-6886
Email: jmhayes@earthlink.net

Secretary-Treasurer: Vera V. Mainz
2709 Holcomb Drive
Urbana, IL 61802
Phone: (217) 328-6158
Email: mainz@illinois.edu

Program Chair: Seth C. Rasmussen
Department of Chemistry and Biochemistry
North Dakota State University
NDSU Dept. 2735, P.O Box 6050
Fargo, ND 58108-6050
Phone: (701) 231-8747
Fax: (701) 231-8831
Email: seth.rasmussen@ndsu.edu

***Bulletin* Editor**: Carmen J. Giunta
Le Moyne College
1419 Salt Springs Rd.
Syracuse, NY 13214-1399
Phone: (315) 445-4128
Fax: (315) 445-4540
Email: giunta@lemoyne.edu

Councilor: Mary Virginia Orna
Department of Chemistry
College of New Rochelle
New Rochelle, NY 10805
Phone: (914) 654-5302
Fax: (914) 654-5387
Email: mvorna@cnr.edu

Councilor: Roger A. Egolf
Pennsylvania State University -
Lehigh Valley Campus, 8380 Mohr Lane
Fogelsville, PA 18051-9999
Phone: (610) 285-5110
Fax: (610) 285-5220
Email: rae4@psu.edu

Alternate Councilor: Joe Jeffers
Ouachita Baptist University
410 Ouachita Street, Box 3786
Arkadelphia, AR 71998-0001
Phone: (870) 245-5216
Fax: (870) 245-5241
Email: jeffers@obu.edu

Alternate Councilor: Arthur Greenberg
Department of Chemistry
University of New Hampshire
Parsons Hall
Durham, New Hampshire 03824
Phone: 603 862-1180
Fax: 603 862-4278
Email: art.greenberg@unh.edu

Historian: Gary Patterson
Department of Chemistry
Carnegie Mellon University
Pittsburgh, PA 15213
Phone: (412) 268-3324
Fax: (412) 268-1061
Email: gp9a@andrew.cmu.edu

Archivist: John Sharkey
Pace University
Department of Chemistry & Physical Sciences
One Pace Plaza
New York, NY 10038-1502
Phone: (610) 758-3582
Email: jsharkey@pace.edu

Final Program

HIST

DIVISION OF THE HISTORY OF CHEMISTRY

S. C. Rasmussen, *Program Chair*

SUNDAY AFTERNOON

Section A

San Diego Marriott & Marina - Boardroom

HIST Tutorial and General Papers

S. C. Rasmussen, *Organizer, Presiding*

1:00 **1.** HIST Tutorial: Search for the material of heredity, DNA and the genetic code. **J. S. Jeffers**

1:40 **2.** Konrad Bloch and the story of cholesterol. **S. Mitra**

2:10 **3.** From Finsen to Fischer: The early days of photomedicine. **M. O. Senge**

2:40 **4.** *Critique of Gerald Geison's deconstruction of Louis Pasteur's chirality work*. **J. Gal**

3:10 Intermission.

3:25 **5.** Tale of seven elements. **E. Scerri**

3:55 **6.** Indium: A retrospective look at its evolution from metallurgy to organic synthesis. **N. Balasubramanian**, **T. L. Viaene**

4:25 **7.** History of contact electrification. **B. Baytekin**, H. Baytekin, B. A. Grzybowski

4:55 **8.** 2011: A stamp odyssey. **D. Rabinovich**

MONDAY MORNING

Section A

San Diego Marriott & Marina - Boardroom

Chemistry Goes West

G. Patterson, *Organizer, Presiding*

8:00 **9.** Stanford chemistry: Tradition and transition. **J. I. Brauman**

8:30 **10.** UC Berkeley: Establishing Excellence. **H. L. Strauss**

9:00 **11.** Excellence from top to bottom: a look at the history of chemistry at UCSD. **M. C. Caserio**

9:30 **12.** A western style? Linus Pauling as research leader. **M. Nye**

10:00 Intermission.

10:15 **13.** Westward moves in the evolution of inorganic chemistry. **J. A. Labinger**

10:45 **14.** Saul Winstein and the foundation of physical organic chemistry at UCLA. **S. J. Weininger**

11:15 **15.** Harvey Mudd College and the genesis of CHEM Study. **T. Beckman**

MONDAY AFTERNOON

Section A

San Diego Marriott & Marina - Boardroom

Springerbriefs History of Chemistry Launch Symposium

Financially supported by Springer Science + Business Media

S. C. Rasmussen, *Organizer, Presiding*

1:00 Introductory Remarks.

1:10 **16.** A prehistory of polymer science. **G. D. Patterson**

1:55 **17.** Chemical history of color. **M. Orna**

2:40 Intermission.

2:55 **18.** A Brief History of Organic Chemistry in Russia: Early Russian Organic Chemists and Their Legacy. **D. E. Lewis**

3:40 **19.** How glass changed the world. **S. C. Rasmussen**

MONDAY EVENING

Section A

San Diego Convention Center - Hall D

Sci-Mix

S. C. Rasmussen, *Organizer*

8:00 - 10:00

4, 6. See previous listings.

20. The Einstein-Szilard Absorption Refrigerator – Marvel of Thermodynamics. **A. H. Berks**

TUESDAY MORNING

Section A

San Diego Marriott & Marina - Boardroom

The Double Bind - Minority Women in Science and Update Thirty Five Years Later

Cosponsored by CMA and WCC

J. Brown, *Organizer, Presiding*

8:00 Introductory Remarks.

8:05 **21.** The Double Bind for Minority Women in S&E - Then and Now. **Y. S. George**

8:35 **22.** Women of the Double Bind. **J. E. Brown**

9:05 **23.** Native Americans in Science Yesterday and Today. **S. C. Begay**, J. E. Brown

9:35 Intermission.

9:50 **24.** Inside the Double Bind ; A Synthesis OF Emperical Research On Women Of Color In STEM. **L. Espinosa**, M. Ong, C. Wright, G. Orfield

10:20 **25.** Women chemists of color: An update. **G. Thomas**, K. Hoffman, Z. Wilson

10:50 **26.** Swimming Against The Tide. **S. L. Hanson**

11:20 27. Overview of The ScienceMakers Project. **J. Richardson**, A. Bruzek

11:50 Panel Discussion.

ABSTRACTS

HIST 1 - HIST Tutorial: Search for the material of heredity, DNA, and the genetic code

Joe S Jeffers, *jeffers@obu.edu. Department of Chemistry, Ouachita Baptist University, Arkadelphia, AR 71998, United States*

Early researchers thought protein had to be the genetic material because it had such variability in the amino acids from which it was made. DNA is composed of only four kinds of nucleotides, so how could it provide the necessary variety? This tutorial will follow the experiments that led to the identification of DNA as the genetic material; to the elucidation of the DNA structure; to the relationship among DNA, RNA, and protein; and to the genetic code itself.

HIST 2 - Konrad Bloch and the story of cholesterol

Smarajit Mitra, *smarajitmitra@hotmail.com. Mitra Chemical Consulting LLC, West St. Paul, Minnesota 55118, United States*

Konrad Emil Bloch was born in 1912 and this year marks his birth centenary. A life that started in what is modern day Poland eventually brought him to the U.S. through his student days in pre-War Germany. His research career which flourished at Harvard was capped by his discovery of the pathways by which cholesterol and fatty acids are metabolized. This seminal work earned him the Nobel Prize in Medicine or Physiology in 1964. This paper will outline the life and times of Konrad Bloch and the many contributions he made in the chemistry of lipids and in many related fields. The fascinating discoveries he made with the newly developed methods using radio-labeled isotopes in the elucidation of organic transformations will be drawn out in the presentation

HIST 3 - From Finsen to Fischer: The early days of photomedicine

Mathias O. Senge, *sengem@tcd.ie. School of Chemistry, Trinity College Dublin, Dublin, Ireland*

The photochemical action of dyes in medicine is widely used for treatment of diseases such as jaundice, skin diseases, neuropsychiatric disorders and cancer. Photomedicine is one of the most rapidly developing fields and, for example in photodynamic therapy, relies on the development of new photosensitizing drugs. Historically it goes back to the work of Finsen on medical uses of sun light and the treatment of *Lupus vulgaris*. Subsequent chemical work aimed at the elucidation of the chemical structure of porphyrins by Willstätter and Fischer then laid the groundwork for the understanding of porphyrins and the chemical synthesis of tetrapyrroles for clinical use. The principles set out by these scientists are still in use for the current development of photosensitizers as cancer drugs, indicators and antimicrobial agents.

HIST 4 - Critique of Gerald Geison's deconstruction of Louis Pasteur's chirality work

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

Louis Pasteur (1822-1895), renowned for his microbiology work, also discovered molecular chirality, thereby launching stereochemistry. After a century of often hagiographic literature extolling Pasteur's accomplishments, recently several negative appraisals have appeared. The foremost such publication, *The Private Science of Louis Pasteur*, a book by Gerald L. Geison (1943-2001), is highly critical of Pasteur's chirality work. Geison's analysis, however, contains many errors of science. For example, he refers to the phenomenon of chirality as “asymmetry” rather than "chirality" or “dissymmetry” (Pasteur's term for chirality), a fundamental error since asymmetry is not synonymous with chirality. Geison also misunderstands the effects of crystallization on optical activity, Pasteur's amyl-alcohol studies, the state of organic chemistry in Pasteur's time, Biot's notions, etc. Crucially, Geison fails to grasp the primary significance of Pasteur's chirality work: the discovery of the

phenomenon of molecular chirality. Geison's conclusions are therefore unfounded and his overall judgment of Pasteur deeply flawed.

HIST 5 - Tale of seven elements

Eric Scerri, *scerri@chem.ucla.edu. Chemistry & Biochemistry, UCLA, Los Angeles, CA 90095, United States*

According to traditional accounts the discovery of atomic number by Moseley paved the way for the isolation of the last remaining seven elements within the first 1-92 (Pa, Hf, Re, Tc, Fr, At, Pm in historical order).
In fact the story is far more interesting and complicated. Moseley himself did not predict that seven elements remained to be found. In addition his X-ray method for identifying elements was not as categorical as usually supposed when it came to its implementation.
The story of these seven elements provides a rich history of numerous failed identifications and priority disputes before the elements were eventually isolated, in some cases as a result of synthetic methods. This study provides new insights into the broader question of what constitutes a scientific discovery and the ever present role of nationalism in scientific research. The lecture will be drawn from a forthcoming book by the author.

HIST 6 - Indium: A retrospective look at its evolution from metallurgy to organic synthesis

Narayanaganesh Balasubramanian, *N.Balasubramanian@ndsu.edu and* ***Tajae L Viaene***, *tajae.l.viaene@my.ndsu.edu. Department of Chemistry and Biochemistry, North Dakota State University, Fargo, ND 58108, United States*

Indium is the 61st most abundant metal in the earth's crust. Discovered in 1864, its importance was not realized until the early 1920s and even then was really only of interest to chemists. At this time, the total amount of isolated indium in the world was limited to one gram. Indium, however, eventually found use in various commercial and industrial applications, becoming a critical component of modern electronics. As one of the least toxic metals, indium is now also replacing many more toxic metals traditionally used in organic synthesis. The objective of this presentation is to provide a brief history of indium, from its discovery to its current applications, with a major focus on its extensive use in organic synthesis.

HIST 7 - History of contact electrification

Bilge Baytekin, *b-baytekin@northwestern.edu, Hasan Tarik Baytekin, and Bartosz A. Grzybowski. Non-equilibrium Energy Research Center, Northwestern University, Evanston, IL 60208, United States*

There are very few major topics in science where a phenomenon is as widely encountered in everyday life and developed into useful technology, while the mechanism remains unclear, even thousands of years after its discovery. Contact electrification (CE), charge development on two surfaces upon their contact, is one such phenomenon. From Thales of Miletus (~600 BC) to Gilbert[1], Volta[2], Faraday[3], Maxwell and many others, scientists researched the intriguing cases of CE, without conclusive answers. Here, we present the historical view for the problem and how history helps us find “chemical” answers[4] to it.

1. W. Gilbert, *De Magnete* **1600** , *2*, Peter Short, London.
2. A. Volta, *Phil. Trans. R. Soc. London* **1800** , *90*, 403-431.
3. M. Faraday, *Experimental Researches in Electricity* **1843** , *2*, R.&J.E. Taylor, London, 2075-2145.
4. H. T. Baytekin et. al., *Science*, **2011** , *333*, 308-312.
This work is funded by US Department of Energy, the Non-equilibrium Energy Research Center (NERC) *DE-SC0000989*.

HIST 8 - 2011: A stamp odyssey

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

This presentation will display an overview of the postage stamps and other philatelic materials (First Day Covers, maximum cards, special cancellations) issued during 2011 in commemoration of the International Year of Chemistry (IYC). While some stamps feature chemical formulas of varying complexity (from water and carbon dioxide to vitamin C and artoindonesianin C, a xanthone natural product), others are centered on the logo of the IYC or depict common glassware used in the laboratory. And a number of stamps have been issued to celebrate the centennial of Marie Curie's Nobel Prize in Chemistry, which she received in 1911 for the discovery of the elements radium and polonium. All in all, it has been a pretty good year for the use of postage stamps to illustrate different aspects of chemistry and its benefits to society.

HIST 9 - Stanford chemistry: Tradition and transition

John I Brauman, *brauman@stanford.edu. Department of Chemistry, Stanford University, Stanford, California 94305, United States*

In the late 1950's and early 1960's Stanford underwent a major change from a first-rate, but relatively modest, university to a world-class research institution. Chemistry, led by W. S. Johnson, played a major role in that development. Aspects of the Chemistry Department prior to and during that transition will be discussed.

HIST 10 - UC Berkeley: Establishing excellence

Herbert L Strauss, *hls@berkeley.edu. Department of Chemistry, Univ of California, Berkeley, Berkeley, CA 94720-1460, United States*

Establishing a world-class institution was the dream of the founders of the University of California at Berkeley. After controversy over goals (applied vs. liberal curriculum, budget), systematic efforts were made to connect the University to the intellectual life of the day. Before Chemistry became a great department under G. N. Lewis starting in 1911, important scientists had been persuaded to make the train trip of many thousands of miles to lecture in Berkeley. Berkeley people seeded much Chemistry in the West, including J M Stillman, founder of the Stanford Chemistry Department and William C. Morgan, first Chair of the UCLA Department. During the1920's and 1930's when little hiring was done, Lewis managed to hire Giauque and Calvin and Seaborg - as well as Libby - all of whom won Nobel Prizes. Berkeley was known for its Physical Chemistry and soon the other areas of chemistry achieved prominence as well.

HIST 11 - Excellence from top to bottom: A look at the history of chemistry at UCSD

Marjorie C. Caserio, *mcaserio@ucsd.edu. Department of Chemistry and Biochemistry, UCSD, La Jolla, CA 92093, United States*

The advent of Chemistry in the 1950's at the imagined University of California, San Diego (UCSD), is intimately connected to the visionary plans of Roger Revelle, Director of the Scripps Institute of Oceanography (SIO). In 1956, a new UC campus in San Diego was authorized by the Regents, and it materialized initially as Revelle intended, as a graduate school of science and engineering. Although it soon became a general campus serving (by 1964) both undergraduates and graduates. Revelle's top down approach was the template used in recruiting the founding faculty. By 1960, there were six chemistry faculty, all National Academy Members and a Nobel laureate (Harold Urey, Hans Seuss, James Arnold, Joseph Mayer, Bruno Zim, Martin Kamen). Excellence breeds excellence, and the next tier of recruits in 1963 were younger but distinguished (Stanley Miller, Ted Traylor, Joseph Kraut). The influence the founding faculty had in shaping the department has been profound and persists to this day. This abstract is cursory but further insights into the early days and the changing times for chemistry at UCSD will be offered in the presentation.

HIST 12 - Western style? Linus Pauling as research leader

Mary Jo Nye, *nyem@onid.orst.edu. History, Oregon State University, Corvallis, Oregon 97331, United States*

Linus Pauling (1901-1994) was born in Portland, Oregon. He completed a B.S. degree in chemical engineering at Oregon Agricultural College in Corvallis in 1922 before entering the graduate program in chemistry at the new California Institute of Technology, where he became a faculty member from 1927 until 1963. Drawing upon recent studies of Pauling, along with archival documents and correspondence, this paper examines Pauling's research collaborations and the style of leadership that he developed for his research groups from the 1920s

through the 1950s. One question addressed is whether there was anything notably "Western" about Pauling's style.

HIST 13 - Westward moves in the evolution of inorganic chemistry

***Jay A. Labinger**, jal@its.caltech.edu. Beckman Institute, California Institute of Technology, Pasadena, CA 91125, United States*

Inorganic chemistry -- a subfield of chemistry that is essentially defined by a negation -- gradually took on its contemporary shape starting around the middle of the last century. I have recently begun a project of tracing that development in both textbooks and frontier science, using records of the Gordon Research Conferences in inorganic chemistry as an indicator for the latter. For this presentation I will discuss preliminary findings, with emphasis on a number of westward migrations that played a key role in some of the research areas that have become central to the field.

HIST 14 - Saul Winstein and the foundation of physical organic chemistry at UCLA

***Stephen J. Weininger**, stevejw@wpi.edu. Department of Chemistry, Worcester Polytechnic Institute, Brookline, MA 02446, United States*

Southern California was an important nexus in the emerging US physical organic network during 1925-1950. Following Howard Lucas and William Young, Jack Roberts at Caltech and Saul Winstein (1912-1969) at UCLA made the area a major locus for mechanistic studies. Winstein's essential role in this development has faded from view; this talk recounts several of his major experimental and theoretical advances that contributed to US preeminence in physical organic chemistry. The Winstein group lead in studying allylic rearrangements; neighboring group effects; ion pair chemistry; and homoconjugation and homoaromaticity, aided by Winstein's commitment to MO as opposed to resonance theory for understanding organic structure and mechanism. Winstein's widely admired experimental studies and theoretical innovations occasionally upset prevailing wisdom. Sometimes they brought him into conflict with a founder of physical organic chemistry, C. K. Ingold. These clashes reflected tensions over the US supplanting the UK as the leader in organic mechanism studies.

HIST 15 - Harvey Mudd College and the genesis of CHEM study

***Tad Beckman**, Tad_Beckman@hmc.edu.Humanities, Harvey Mudd College, Claremont, CA 91711, United States*

Harvey Mudd College was founded in 1955 with a vision to create an elite school of science, mathematics, and engineering. One of the founding faculty, J. Arthur Campbell, was also one of the original leaders of the CHEM Study project to create a modern high school chemistry curriculum. The chemistry faculty at Harvey Mudd played a pivotal role in the history of the project. They hosted the “summer of love” in 1960 that got the project off the ground. They also were directly involved in the production of many of the teaching films that were produced for the CHEM Study effort. A personal reminiscence of those days and a survey of the films will be presented.

HIST 16 - Prehistory of polymer science

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

The present volume examines the time period before there was a coherent scientific community devoted to the study of macromolecules. It starts with a series of studies of particular polymeric materials that were important in this pre-paradigm period. The history of natural rubber is followed from the time of the great French explorers (1735) to the formulation of the first successful theory of rubber elasticity (1935). The history of polystyrene is presented from the discovery of styrene in the late 18th century to 1935. The first commercially successful polymeric material synthesized completely from inexpensive small molecules, Bakelite, provides a fascinating story of both academic and industrial chemistry. The story of the polysaccharides and Sir Norman Haworth (Nobel 1937) completes the studies of materia polymerica. The crowning event in the prehistory of polymer science is the Faraday Society Discussion of 1935 on Polymerization. A history of the Faraday Discussions that led up to this event is presented. The chronicle of the Faraday Society includes Discussion Meetings that went from glory to glory until the Society was absorbed by the Royal Society of Chemistry. The book concludes with an essay on the prehistory of polymer science. The factors that influenced this history form a fascinating study of the formation of a now thriving scientific research community.

HIST 17 - Chemical history of color

Mary Virginia Orna, *mvorna@cnr.edu. Department of Chemistry, College of New Rochelle, New Rochelle, NY 10805, United States*

Color is the primary sense and the first mentioned in antiquity, with theories on the nature of light and color going back to the ancient Greeks. Aristotle made an important contribution to the concept of selective absorption of light. In the first century, Seneca, a Roman philosopher, noted that prisms reproduce the colors of the rainbow, and since that time the rainbow has gone a long way. Light-years away from Seneca, Niels Bohr eliminated the rainbow from his experiments, thus creating the first "blackbody" radiator. From this invention, Bohr was able to explain the color of hydrogen spectra – by the absence of color! Max Planck while searching for the missing wavelengths of the "ultraviolet catastrophe" discovered light and energy were quantized. These are just some examples of the impact of light and color on scientific theory and human self-understanding. This paper will describe how the monograph, "The Chemical History of Color," fleshes out the history of color from the chemical point of view, beginning with the first recorded uses of color down to the development of our modern chemical industry, dipping into some theoretical physics along the way. It will show that color pervades every aspect of our lives, our consciousness, our perceptions, our useful appliances and tools, our playthings, our entertainment, our health, our diagnostic apparatus – all based in no small part on chemistry.

HIST 18 - Brief history of organic chemistry in Russia: Early Russian organic chemists and their legacy

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

At various times in its history, Russia has been a military superpower, an economic superpower, and a political superpower, but the general impression has been that when it comes to higher education, Russia always lagged behind her peers. This impression is not necessarily wrong, and coupled with the fact that Russia uses the Cyrillic, rather than the Roman alphabet, may have led many in the west to be unaware of Russian contributions to chemistry—despite the fact that the Periodic Table of the elements was the work of a Russian! In this paper, a brief overview of the development of higher education in Russia will be given, with the development of organic chemistry in Russia providing the focus. One should expect to find that many of the reactions and named rules of introductory courses in organic chemistry are of Russian, rather than German origin.

HIST 19 - How glass changed the world

Seth C Rasmussen, *seth.rasmussen@ndsu.edu. Department of Chemistry and Biochemistry, North Dakota State University, Fargo, ND 58108, United States*

Glass production is thought to date to ~2500 BC and had found numerous uses by the height of the Roman Empire. The modern view of glass-based chemical apparatus was quite limited, however, due to a lack of glass durability under rapid temperature changes and chemical attack. In the mid 1200's, this began to change as the glassmakers of Venice and Murano began blending Roman methods with raw materials from the Levant, as well as developing pretreatment and purification methods of the raw materials. This combination resulted in a new glass with a strength and durability for use in chemical apparatus, leading to rapid advancements in chemical practice. An overview of the history and chemistry of glass technology will be presented, from its origins in antiquity to its dramatic expansion in the 13th century, concluding with its impact on society in general, particularly its effect on chemical practices.

HIST 20 - Einstein-Szilard absorption refrigerator: Marvel of thermodynamics

Andrew H. Berks, *aberks@nostrumlabs.com. Nostrum Laboratories, Inc., New York, NY 10022, United States*

In 1930, Albert Einstein and Leo Szilard were awarded a United States Patent for a heat pump that required no electricity, has no moving parts, and was powered by a heat source. Heat pumps, including refrigerators, are counterintuitive devices in general because heat is not a tangible thing that can be carried by hand from one place to another, so some kind of thermodynamic trick must always be used in a heat pump. This poster will discuss the Einstein-Szilard refrigerator and recent attempts to construct a working model.

HIST 21 - Double bind for minority women in S&E: Then and now

Yolanda S. George, *ygeorge@aaas.org. Department of Education and Human Resources Program, American Association for the Advancement of Science, Washington, DC 20005, United States*

April 2011 marked the 35th anniversary of *The DoubleBind: The Price of Being a Minority Woman in Science* publication. This seminal report documented the educational and career experiences of minority women in S&E. Since 1976, minority women have made strides in S&E degree attainment; however, this progress varies widely by degree level, discipline, and race/ethnicity. For example, the annual number of Black female S&E doctorates was 391 in 2000 and 594 in 2008; while the number for Hispanic female was 360 in 2000 and 639 in 2008. The annual number for Black female physical sciences doctorate was 26 in 2000 and 36 in 2008; while the annual number for Hispanic female was 24 in 2000 and 40 in 2008. While sparse, other data suggest that minority women have made progress in S&E employment, but obstacles and challenges may still exist in terms of access to elite positions and advancement.

HIST 22 - Women of the double bind

Jeannette E. Brown, *jebrown5134@comcast.net. Independent Scholar, Hillsborough, NJ 08844-4816, United States*

There were seven women who were chemists or chemical/environmental engineers who were among the thirty women participants in the Double Bind Conference. Of these seven women, five were African American, the other two were Native American and Puerto Rican. In this paper we will discuss the lives of the deceased women who participated in this conference and whose lives are also detailed in the authors' book "African American Women Chemist". The recorded voices of the living women who were also at the original Double Bind meeting may be included in this talk. The full story of Dr. Marie Daly who was the first African American woman to receive a PhD in chemistry will be detailed in a future symposium. You will find that these women were hiding in plain sight when you hear about the accomplishments of these women.

HIST 23 - Native Americans in science yesterday and today

Shanadeen C Begay[1], *scbegay@bu.edu and Jeannette E. Brown*[2]*. (1) Department of Chemistry, Boston University, Boston, MA 02215-2521, United States (2) Independent Researcher, Hillsborough, NJ 08844-4816, United States*

There was one native American woman who could be considered to work in a chemical field since she was an environmental engineer who attended the Double Bind Conference. Her name is Georgia Pedro. We will discuss any information that we have about her. This talk will also be about the current status of Native Americans in science, their access to science and those who are currently working in the field. The information will be drawn from the authors work as a Diversity Partner in the Native American Community.

HIST 24 - Inside the double bind: A synthesis of emperical research on women of color in STEM

Lorelle Espinosa[1], *lorelleespinosa@gmail.com, Maria Ong*[2]*, Carol Wright*[3]*, and Gary Orfield*[4]*. (1) Department of Policy and Strategic Initiatives, Institute for Higher Education Policy, Washington, DC 20036, United States (2) Department of Education Research Collaborative, TERC, Cambridge, MA 02140, United States (3) Department of Education Research Collaborative, TERC, Cambridge, MA, United States (4) Department of Education, UCLA, Los Angelos, CA 90095-1521, United States*

I will present an overview of nearly 40 years of scholarship on the postsecondary educational and career experiences of women of color in science, technology, engineering, and mathematics (STEM).This talk will be a synthesis of current and past research on the subject. This offers a complex portrait of the myriad factors that influence the retention, persistence, and achievement of women of color in STEM at the undergraduate,

graduate, and career levels. The researchers argue that current underrepresentation of women of color in STEM fields represents an underutilization of our nation's human capital and raises concerns of equity in U.S. education and employment. The policy implications of the findings will be discussed and gaps in the literature will be highlighted as to where further research is needed.

HIST 25 - Women chemists of color: An update

Gloria Thomas[1], *gthomasphd@gmail.com, Katherine Hoffman*[2]*, and Zakiya Wilson*[3]*. (1) Department of Chemistry, Xavier University of Louisiana, New Orleans, LA 70126, United States (2) Diversity Programs, American Chemical Society, Washington, DC 20036, United States (3) Office of Strategic Initiatives, Louisiana State University, Baton Rouge, LA 70803, United States*

While much progress for women has been made over the last couple of decades, African American, Native American, Asian American and Hispanic American women are not entering and advancing in the sciences at the same rates as their Caucasian counterparts. To explore the issues, a Women Chemists of Color Summit (funded by NSF #1027608 was held during the Fall 2010 ACS meeting to broaden awareness of challenges for women of color found at this very specific intersection of gender and ethnicity, gather more data about women chemists of color, and provide a forum for building community among women of color. This talk will review some of the existing data, highlight insights learned during the Summit and feature progress made in this initiative since the Summit.

HIST 26 - Swimming against the tide

***Sandra L. Hanson**, hanson@cua.edu. Department of Sociology, Catholic University, Washington, DC 20064, United States*

“They looked at us like we were not supposed to be scientists” says one young African American girl describing one openly hostile reaction she encountered in the classroom. This study argues that many young minority girls are interested in science but the racism and sexism in the science classroom often discourage them. Experiences of African American girls in science education are examined using multiple methods of quantitative and qualitative research including a web survey and vignette techniques. The multicultural framework addresses the role of agency and resistance that encourages and sustains interest in science in African American families and communities.

HIST 27 - Overview of The ScienceMakers Project

***Julieanna Richardson**, jlr@thehistorymakers.com and Alison Bruzek. The HistoryMakers, Chicago, IL 60616, United States*

In 2009, the National Science Foundation awarded a $2.3 million grant to The HistoryMakers, the nation's largest African American oral history archive. The grant, entitled ScienceMakers: African Americans and Scientific Innovation, seeks to expose the public to African American role models and their achievements in science, technology, engineering, and mathematics. This will be accomplished through oral history interviews with 180 scientists, catalogued with EAD and EAC-CPF finding aids; youth and adult public programs featuring the scientists at ten U.S. science centers; the ScienceMakers Toolkit curriculum for K-12 science educators; a YouTube contest for students to envision themselves as ScienceMakers; and online dissemination through a digital video archive. The project will span a period of four years and is aided by support from the advisory board consisting of members from the American Association for the Advancement of Science, the National Academy of Sciences, and several science centers and universities.