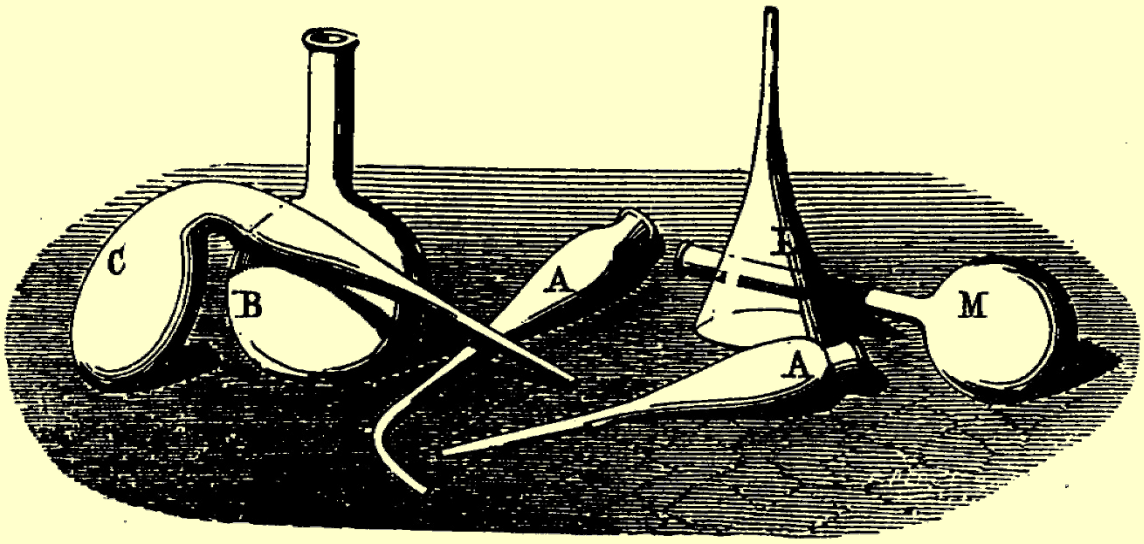
American Chemical Society

DIVISION OF THE HISTORY OF CHEMISTRY



PROGRAM & ABSTRACTS

264th ACS National Meeting
Chicago, IL (Hybrid)
August 21-25, 2022

Nicolay V. Tsarevsky, Program Chair

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HIST Programming

Message from the HIST Program Chair

I am delighted to welcome you to the Fall 2022 National ACS Meeting, which will take place in the beautiful – and fun to explore – city of Chicago. On behalf of HIST, I invite you to join us during our two-day program, which will consist of informative and appealing lectures and posters. For those of you attending in person, I hope you would be willing and able to stay with your fellow attendees and the presenters to take advantage of the wonderful network opportunities that are the hallmark of a live conference. The lectures will commence on Monday morning. On that entire day, as well as on Tuesday morning, you will have the opportunity to enjoy the HIST General Papers that will cover a wide range of topics, as you can justly expect. The Tuesday afternoon session will honor the recipient of the 2022 HIST Award – Dr. Marco Beretta of the University of Bologna – and will feature several lectures on topics including (but not limited to) the history, manufacture, properties, and uses of glass. After all, 2022 is the international year of one of the most fascinating and useful materials – glass! I also cordially invite you to attend the SciMix session on Monday evening and to stop by the HIST table at Division Row. My fellow HIST-ers and I would love to meet and chat with you, and especially to exchange ideas on how to make the Division better, more exciting, and healthier. In addition, on Tuesday evening, there will be a poster session that will feature HIST posters. If you would like to meet like-minded individuals who love history and chemistry in a relaxed atmosphere, please consider joining the HIST Awards dinner on Tuesday evening (check the following pages for details), during which we will celebrate the research accomplishments and service of the HIST awardee and the newly minted HIST fellows. I should add that HIST will sponsor symposia later this year at regional meetings, too. Do check them out, if you are planning to attend one or more of those meetings.

Before I close, I would like to remind you that next year we will be celebrating the Centennial of HIST. As you can imagine, we are eagerly preparing for this major event, but we would love to learn about any suggestions you may have. We certainly hope you will take part in the festivities!

I know you will enjoy our program, the Meeting, and Chicago with all its museums and other cultural venues. Stay well and healthy, and I look forward to seeing you or hearing from you!

Nick Tsarevsky, *HIST Program Chair*

HIST SYMPOSIA, 264th ACS Meeting, August 21-25, 2022

Schedules and abstracts are listed at the end of this Newsletter.

HIST Award Banquet

As part of its activities at the 264th ACS National Meeting in Chicago, the History of Chemistry Division of the American Chemical Society is pleased to host the 2022 HIST Award Banquet honoring Dr. Marco Beretta and celebrating the accomplishments of the newly-elected HIST Fellows. The Banquet will be held at Tapas Valencia (www.tapasvalencia.com, 1530 South State Street Chicago, IL 60605, Phone: 312.842.4444) on Tuesday, August 23. It will start at 7:00 PM and will feature a tapas-style dinner (the Cuarzo package), assorted desserts, and a cash bar. **Tickets are $60 and can be purchased from Vera Mainz, HIST Secretary-Treasurer.** (Tickets cover the full cost of the meal, tip and tax. Ordinary beverages are included in the ticket cost. Alcoholic beverages are available for additional cost from the cash bar. You can pay Vera via check or cash (exact amount preferred) at the banquet or when you see her during the meeting. If you do plan to attend, please **RSVP by August 19th (Friday)** via email to Nick Tsarevsky (nvt@smu.edu) and/or Vera Mainz (mainz@illinois.edu).

UPCOMING MEETINGS AND HIST DEADLINES

Subject to change. Check the HIST website (http://www.scs.illinois.edu/~mainzv/HIST/) for updates.

2022 Southeastern Regional Meeting of the ACS, (SERMACS 2022) in San Juan, PR, October 19-22, 2022

La Historia de Pioneros y Descubridores en Química (Invited and contributed) Mary Virginia Orna, ChemSource, Inc., Mount Vernon, NY, email: maryvirginiaorna@gmail.com; Daniel Rabinovich, Joint School of Nanoscience and Nanoengineering, Greensboro, NC, email: Dan.Rabinovich@uncg.edu. Scheduled to take place on Thursday afternoon, October 20, 2022, and Friday afternoon, October 21, 2022.

2022 Southwest Regional Meeting (SWRM) of the ACS, Baton Rouge, LA, November 6-9, 2022

Chemistry Connections: Learning from History (Invited and contributed) Nicolay V. Tsarevsky, Department of Chemistry, Southern Methodist University, Dallas, TX 75275, Phone: 214-768-3259, email: nvt@smu.edu; Christine Hahn, Department of Chemistry, Texas A&M University Kingsville, email: Christine.Hahn@tamuk.edu. Scheduled to take place on November 8, 2022 (Tuesday).

265th ACS Meeting, Indianapolis, IN, March 26-30, 2023

HIST Centennial (Invited) Gary Patterson, Vancouver, WA 98661, 412-480-0656, email: gp9a@andrew.cmu.edu

Workshop on Traditional Research Methods in History (Invited) Seth C. Rasmussen, Department of Chemistry and Biochemistry, North Dakota State University, NDSU Dept. 2735, P.O. Box 6050, Fargo, ND 58108, Phone: 701-231-8747, email: seth.rasmussen@ndsu.edu

Past ACS Presidents: Helen Free (Invited and seeking contributors) Janan Hayes, email: janan.hayes@gmail.com

Science in Support of Technical Art History (Invited and seeking contributions) Mary Virginia Orna, ChemSource, Inc., Mount Vernon, NY, NY, Phone: 914-310-0351, email: maryvirginiaorna@gmail.com; Gregory D. Smith, Indianapolis Museum of Art, gdsmith@discovernewfields.org

Tutorial and General Papers (Seeking contributors) Nicolay V. Tsarevsky, Department of Chemistry, Southern Methodist University, Dallas, TX 75275, Phone: 214-768-3259, email: nvt@smu.edu

266th ACS Meeting, San Francisco, CA, August 13-17, 2023

HIST Award Symposium (Invited) Nicolay V. Tsarevsky, Department of Chemistry, Southern Methodist University, Dallas, TX 75275, Phone: 214-768-3259, email: nvt@smu.edu

History of Forensic Chemistry (Invited and contributed) Nicolay V. Tsarevsky, Department of Chemistry, Southern Methodist University, Dallas, TX 75275, Phone: 214-768-3259, email: nvt@smu.edu

Tutorial and General Papers (Seeking contributors) Nicolay V. Tsarevsky, Department of Chemistry, Southern Methodist University, Dallas, TX 75275, Phone: 214-768-3259, email: nvt@smu.edu

267th ACS Meeting, New Orleans, LA, March 17-21, 2024

The Birth of the 3rd Dimension in Chemistry (Invited and seeking contributions) Arthur Greenberg, Department of Chemistry, University of New Hampshire, Durham, New Hampshire 03824, Phone: 603-862-1180, email: art.greenberg@unh.edu; David E. Lewis, Department of Chemistry and Biochemistry, UW-Eau Claire, Eau Claire, WI 54702, Phone: 715-836-4744, email: lewisd@uwec.edu

Tutorial and General Papers (Seeking contributors) Nicolay V. Tsarevsky, Department of Chemistry, Southern Methodist University, Dallas, TX 75275, Phone: 214-768-3259, email: nvt@smu.edu

Final Program

DIVISION OF THE HISTORY OF CHEMISTRY (HIST)

N. V. Tsarevsky, *Program Chair*

Sunday, August 21, 2022: Evening

Location: Hyatt Regency McCormick Place, Boardroom 2

05:00-7:00 pm HIST Executive Committee meeting

Monday, August 22, 2022: Morning session (8:00 – 11:20 am)

Section A

Location: Hyatt Regency McCormick Place, Regency C

General Papers

N. V. Tsarevsky, Organizer
M. Stefan, N. V. Tsarevsky, Presiding

8:00 Reform of weights and measures in late 18th-century France, Great Britain, and United States. **C.J. Giunta**

8:30 Anticipating the turn of the 19th century: Cobalt chemistry recipes from the Meissen archives (1720-1730). **N. Zumbulyadis**

9:00 Understanding the chemistry of the universe: Some early studies. **N.V. Tsarevsky**

9:30 Intermission.

9:50 History and philosophy of computational chemistry. **M.L. Renier**

10:20 Vitamin P: Its perplexing history. **J.B. Friesen**, G.F. Pauli, D.S. Seigler

10:50 New six-volume cultural history of chemistry: Description, analysis, and assessment. **A.J. Rocke**

Monday, August 22, 2022: Morning

Location: Hyatt Regency McCormick Place, Regency C

11:20 – 11:50 HIST Business Meeting – Open to All

Monday, August 22, 2022: Afternoon session (2:00 – 5:20 pm)

Section A

Location: Hyatt Regency McCormick Place, Regency C

General Papers

N. V. Tsarevsky, Organizer
M. Stefan, N. V. Tsarevsky, Presiding

2:00 Mellow yellow: A brief chemical history of yellow pigments and dyes through the ages. **E. Bosch**

2:30 Analgesic contents of patent medicines of the early 20th century: Bromo-Seltzer and Antikamnia. **D. Morris**, **A. Haddy**

3:00 Historical alternative conceptions in chemistry: Preparation and properties of sulfur and its compounds. **W.P. Palmer**

3:30 Intermission.

3:50 Chemical glassware: A philatelic history. **D. Rabinovich**

4:20 At work in “Nature’s Laboratory”: Antoine Laurent Lavoisier and the chemical analysis of minerals. **L. Palmer**

4:50 History of the Malta Conferences: Building bridges for Peace in the Middle East. **E.A. Nalley**, Z.M. Lerman, M.Z. Hoffman

Monday, August 22, 2022: Sci-Mix Poster Session (8:00 – 10:00 pm)

Location: McCormick Place Convention Center, Hall F2

The poster board numbers are indicated below.

2760. Vitamin P: Its perplexing history. **J.B. Friesen**, G.F. Pauli, D.S. Seigler

2762. At work in “Nature’s Laboratory”: Antoine Laurent Lavoisier and the chemical analysis of minerals. **L. Palmer**

2764. Analgesic contents of patent medicines of the early 20th century: Bromo-Seltzer and Antikamnia. **D. Morris**, **A. Haddy**

2766. History of the Malta Conferences: Building bridges for Peace in the Middle East. **E.A. Nalley**, Z.M. Lerman, M.Z. Hoffman

2768. How the Chicago section helped desegregate National ACS Meetings. **J.W. Kurutz**

2770. More than 125 years of chemistry in Chicago: A history of the Chicago Section ACS. **J.W. Kurutz**

2772. Photographic private insights into historic gibbs medal ceremonies. **J.W. Kurutz**

2774. Chemical bulletin by the Chicago Section ACS: Engaging chemists for over one hundred years. **A.K. Arzadon**, **P.F. Brandt**, **J.W. Kurutz**, **M.E. Schott**

Tuesday, August 23, 2022: Morning session (8:00 – 11:20 am)

Section A

Location: Hyatt Regency McCormick Place, Regency C

General Papers

N. V. Tsarevsky, Organizer
M. Stefan, N. V. Tsarevsky, Presiding

8:00 Sir Christopher Ingold’s contributions to organic chemistry. M.C. Biewer, **M.C. Stefan**

8:30 Lev Aleksandrovich Chugaev (1874-1922): Bridging organic and inorganic chemistry. **D.E. Lewis**

9:00 Celebrating the sesquicentennial of the birth of Mikhail Semyonovich Tsvet (1872-1919), the father of chromatography. **D.E. Lewis**

9:30 Intermission.

9:50 Chicago-area chemists collaborate on accolades and cash for Madame Curie. **M.E. Schott**

10:20 More than 125 years of chemistry in Chicago: A history of the Chicago Section ACS. **J.W. Kurutz**

10:50 How the Chicago section helped desegregate National ACS Meetings. **J.W. Kurutz**

Tuesday, August 23, 2022: Afternoon session (2:00 – 6:00 pm)

Section A

Location: Hyatt Regency McCormick Place, Regency C

HIST Award Symposium Honoring Marco Beretta

S. Rasmussen, Organizer
S. Rasmussen, Presiding

2:00 Introductory Remarks.

2:05 Suitability of historic glasses for chemical glassware: Using modern compositional relationships to predict properties of 15th-18th century glasses. **S.C. Rasmussen**

2:45 Fluids under fire: Robert Boyle on distillation, elements, and particles. **V. Boantza**

3:25 Antoine Lavoisier's refutation of the sedimentation of water. **L. Kambas**

4:05 Intermission.

4:20 Glass for chemistry and the chemistry of glass: A kaleidoscopic story. **U. Veronesi**

5:00 Antoine-Laurent Lavoisier and glassmaking. **M. Beretta**

Tuesday, August 23, 2022: Poster session (7:00 – 9:00 pm)

Location: McCormick Place Convention Center, Hall F2

The poster board numbers are indicated below.

General Papers

N. V. Tsarevsky, Organizer

3235. Chemical bulletin by the Chicago Section ACS: Engaging chemists for over one hundred years. **A.K. Arzadon**, **P.F. Brandt**, **J.W. Kurutz**, **M.E. Schott**

3237. Photographic private insights into historic Gibbs medal ceremonies. **J.W. Kurutz**

ABSTRACTS

Paper ID 3741868

Reform of weights and measures in late 18th-century France, Great Britain, and United States

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

It is widely known that the units of length and mass used in science all over the world and in civic and commercial applications in most of the world originated in the First French Republic in the aftermath of the French Revolution. Less well known is the fact that reform of weights and measures was an issue considered by the governments of Great Britain and the new United States at roughly the same time. These endeavors were not entirely independent, although the results in the three nations were quite different. The proposals in all three nations will be described, including the evolution of those in France up to the deposit of the prototype meter and kilogram in 1799.

Paper ID 3719147

Anticipating the turn of the 19th century: Cobalt chemistry recipes from the Meissen archives (1720-1730)

Nicholas Zumbulyadis[1,2], nicholas.zumbulyadis@icloud.com. (1) Chemistry and Biochemistry, University of Delaware, Newark, Delaware, United States (2) Consultant, Independent Scholar, Rochester, New York, United States

The artisans at Meissen, Europe's first porcelain manufactory founded in 1710, anticipated aspects of cobalt chemistry that were not treated in the open scientific literature until 50-80 years later. They recorded their experiments in laboratory notebooks that were inaccessible to outside scholars until the 20th century. In this presentation we will discuss two such instances by comparing the archival manuscripts to later publications. In his attempt to match the cobalt blue color of Chinese porcelain David Köhler (1683-1723) in 1720 (and probably as early as 1715) described the preparation of a blue pigment that is almost identical to Louis Jacques Thénard's (1777-1857) preparation of cobalt aluminum spinel reported in the Journal des Mines of 1802. Similarly, in his book of enamel recipes completed in 1731, the Meissen painter Johann Gregorius Höroldt (1696-1775) described a complex process of fractional precipitation to purify cobalt carbonate from cobalt ores. This procedure is identical to Rudolf Abich's (1738-1809) preparation of pure cobalt carbonate as described in Crell's Chemische Annalen of 1784. Comparisons of the manuscripts provide

us with valuable insights into the differences in the styles of chemical vs artisanal descriptions of very similar laboratory procedures.

Paper ID 3752737

Understanding the chemistry of the universe: Some early studies

Nicolay V. Tsarevsky, nvt@smu.edu. Department of Chemistry, Southern Methodist University, Dallas, Texas, United States

By the end of the 18th century, a number of analytical procedures and instruments (accurate balances, the blowpipe, etc.), as well as analytical – mostly color – reactions had been developed, which allowed for studying the chemical composition of extraterrestrial bodies directly accessible on Earth, such as meteorites. For example, the investigations of Axel Fredrik Cronstedt (1722-1765) and Torbern Bergman (1735-1784), related to the analysis of rocks, ores, and minerals, inspired and informed early work on the qualitative and quantitative analysis of meteorites, such as the studies conducted by Edward Howard (1774-1816). In addition, the production of optically clear glass and therefore – of high-quality optical instruments – enabled the accurate spectral studies of the Sun, carried out by William Hyde Wollaston (1766-1828) and especially Joseph von Fraunhofer (1787-1826). This early research soon led to the discovery of the chemical element helium in the Sun before it was found on Earth. In the second half of the 19th century, William Huggins (1824-1910) published the first detailed spectral studies that elucidated the chemical composition of comets, stars, and nebulae. These and some other pioneering works on the chemical composition of and the nature of chemical reactions occurring in the universe will be the subject of this talk.

Paper ID 3727934

History and philosophy of computational chemistry

Michael L. Renier, mlrenier@yahoo.com. chemistrymeds, South Range, Michigan, United States

Computational chemistry started by using computers to do calculations on molecular mechanics and quantum mechanics methods. In 1968,1969 the golem-1 computer in Israel utilized fortran to run molecular mechanics calculations and during that time period quantum mechanics calculations on computers was first done at MIT. The typically start points in computational chemistry is to create a chemistry hypothesis and develop a quality model system. although sometimes models are wrong. Corwin Hansch first developed a model system for QSAR research studies in the 1950s. In recent years modeling in solvents especially water has become important. John Pople first did quantum mechanics calculations on water polymers in the 1970s. The interaction of water with molecules using implicit or explicit models is becoming an emphasis for the philosophy of computational

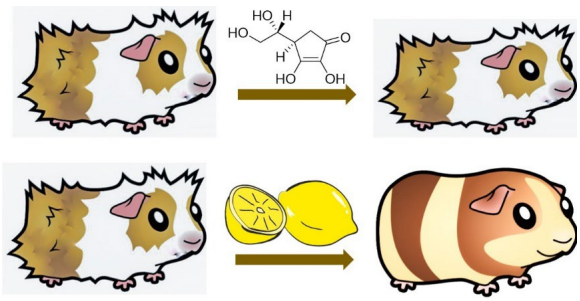
chemistry. Quantum mechanics methods have become more accurate to experimental results,although cancellation of errors is still needed in computational chemistry when studying interactions. Datasets in computational chemistry have become larger in recent years with ligand drug databases like ZINC database, where deep and machine learning methods will become important.

Paper ID 3741486

Vitamin P: Its perplexing history

John B. Friesen[1,2], jbfriesen@dom.edu, Guido F. Pauli[2], David S. Seigler[3]. (1) Physical Sciences Department, Dominican University, River Forest, Illinois, United States (2) Pharmacognosy Institute, College of Pharmacy, University of Illinois Chicago, Chicago, Illinois, United States (3) Department of Plant Biology, University of Illinois Urbana-Champaign, Champaign, Illinois, United States

The presence vital amines (vitamins) at the interface of chemistry and nutrition, proposed by Casimir Funk in the early 20th century, proved to be a useful paradigm by which to discover a host of dietary chemicals that were essential for human health. The initial investigation of Funk's proposed anti-scurvy factor by Axel Holst and Theodor Frölich followed by the Nobel prize winning work of Albert Szent-Györgyi is considered to a be a triumph of modern nutrition research. However, the studies undertaken by Szent-Györgyi, Joseph Svirbely, C. G. King and many others indicated the presence of another compound or compounds needed to accompany Vitamin C to completely remedy scurvy symptoms. Subsequent experimental evidence led to the proposal of vitamin P (permeability) as an essential phytochemical nutrient. In certain pathological conditions characterized by an increased permeability or fragility of the capillary wall, highly purified or synthetic ascorbic acid was ineffective for reducing the permeability, whereas the condition was readily cured by administration of extracts of Hungarian red pepper or lemon juice. However, attempts to isolate and characterize vitamin P gave confusing and sometimes irreproducible results, which today can be interpreted as rooted in the unrecognized chemical complexity of the scorbutic diets and tested anti-scorbutic preparations. As investigations continued, several flavonoids and a few coumarins were shown to have vitamin P activity. The historic inability to define a single compound and specific mode of action led to general skepticism about vitamin P. The reasonable conclusion is that several abundant and metabolically related plant constituents fill this essential role in human nutrition at the interface of human health, metabolism, and chemistry.



Paper ID 3723672

New six-volume cultural history of chemistry: Description, analysis, and assessment

Alan J. Rocke, ajr@case.edu. History, Case Western Reserve University, Cleveland, Ohio, United States

In January 2022 Bloomsbury (London) published "A Cultural History of Chemistry," which in six chrologically defined volumes treats the history of our science from the neolithic to the present. The project comprises a total of 54 chapters written or edited by 50 scholars of 10 different nationalities, and covers all aspects of chemistry: theory and ideas, laboratory apparatus and experimental practice, institutions, artisanal and industrial activity, chemical engineering, social contexts, and related cultural aspects. Over the past six years, this project was initiated and has been co-directed by Peter Morris of the London Science Museum and the speaker. The speaker will describe the project, and offer an assessment of both the advantages and the limitations of the format, the meaning of "cultural history" in the present context, the potential uses of the set, and the possible overall significance of the project for the future of our field.

Paper ID 3745246

Mellow yellow: A brief chemical history of yellow pigments and dyes through the ages

Eric Bosch, ericbosch@missouristate.edu. Chemistry, Missouri State University, Springfield, Missouri, United States

This talk will highlight aspects of the chemistry, and history, of natural and synthetic sources of inorganic and organic yellow pigments and dyes through the ages. On the inorganic side we begin with the iron ore limonite known since ancient times, to the Egyptian synthesis of Naples yellow, lead antimonate, to nickel lead titanate first used in the 13th century. A wide variety of yellow pigments were also prepared during the latter half of the 18th century and the early 19th century following the isolation of many transition metals and included cobalt yellow, chrome yellow and cadmium yellow. Common inorganic pigments currently in use include synthetic yellow ochre and bismuth yellow. On the organic side plant sources of yellow dyes used since antiquity include weld, saffron and turmeric from which dyes were often used in conjunction with metal mordants while Gamboge is also of interest. Modern synthetic organic yellows begin in the late 19th century including quinoline yellow described in 1878, quinacridones named in 1896 and acrylide yellow (Hansa yellow) discovered in 1909. Common organic yellows at present include benzoimidazolone yellow and diarylide yellow while hybrid compounds like nickel azo yellow are also in use.

Paper ID 3746614

Analgesic contents of patent medicines of the early 20th century: Bromo-Seltzer and Antikamnia

Dylan Morris, dcmorris4699@gmail.com, Alice Haddy, aehaddy@uncg.edu. Chemistry and Biochemistry, UNC Greensboro, Greensboro, North Carolina, United States

Patent medicines, proprietary medicines sold without prescription, are of historical interest for their role in the development of the pharmaceutical industry and for their notably dubious reputation. They provided a major source of self-medication, although they may have had physiological effects that were poorly understood by the consumer. Because specific preparations were not patented, the formulation of a patent medicine could be changed at any time. During the first half of the 20th century, as regulatory oversight developed, patent medicines transitioned from essentially unregulated products to ones that were accountable for their contents and medical effectiveness. Two early synthetic analgesic/antipyretic drugs that were often used in patent medicines are acetanilide and phenacetin (acetphenetidin), which are both predecessors of acetaminophen. Acetanilide in particular is known for its side-effect of cyanosis due to poor blood oxygenation. Bromo-Seltzer and Antikamnia were two popular analgesic-containing patent medicines used widely from the 1890s through the mid-20th century. In this study, the contents of each were tracked over time using a combination of vintage package labeling and contemporary published analyses. Both products originally used acetanilide as the major analgesic. After passage of the 1906 Pure Food and Drug Act, the acetanilide in Antikamnia was replaced with phenacetin, which was used until the product was discontinued in the 1930s. The acetanilide in Bromo-Seltzer was also replaced with phenacetin after 1906, but within a few years acetanilide returned as a major ingredient. Bromo-Seltzer continued to contain acetanilide well into the 1970s, suggesting that this drug may have had a more significant role in self-medication than is generally recognized. Knowledge about the changing contents of products such as Antikamnia and Bromo-Seltzer offers a window into the health of past generations and insight into the evolution of old-time patent medicines into the over-the-counter medicines of today.

Paper ID 3734527

Historical alternative conceptions in chemistry: Preparation and properties of sulfur and its compounds

William P. Palmer, bill_palmer15@hotmail.com. STEM, Curtin University, Perth, Western Australia, Australia

Over the past thirty years, I have built up a unique resource of about 400 American laboratory manuals used by individual students in their practical chemistry between 1890 and 1950. Alternative conceptions (sometimes called misconceptions) are the ideas that students possess about particular science topics. Student manuals cover a large range of chemical topics, traditionally arranged around the common gases. In many student manuals

of this period, the manual's author wrote instructions and questions on the left-hand page and the student wrote answers on the right-hand page. These answers are inspected for misconceptions. This study is the latest in a series of studies about student alternative conceptions that relate to particular areas of practical chemistry which have provided evidence relating to physical and chemical change, oxygen, hydrogen, carbon dioxide, nitrogen and the halogens. Copies of these earlier papers may be found on Researchgate. For this study, a single topic, the preparation and properties of sulfur and its compounds will be investigated. Any of the students' alternative conceptions found in the manuals that relate to sulfur will be recorded and compared with other research on students' alternative conceptions about sulfur from recent research where possible.

Paper ID 3741667

Chemical glassware: A philatelic history

Daniel Rabinovich, Dan.Rabinovich@uncg.edu. Joint School of Nanoscience and Nanoengineering, Greensboro, North Carolina, United States

Chemical glassware has played an essential role in the development of chemistry as we know it today, from the isolation of elements such as phosphorus (Hennig Brandt, 1669) and oxygen (Priestley, 1774) to the discovery and study of gases. This presentation will use postage stamps to illustrate various milestones in the development of modern chemical glassware, from the origins of glass itself and its practical and decorative applications through the ages to the development of borosilicate glass and modern applications in the laboratory and daily life.

Paper ID 3743949

At work in "Nature's Laboratory": Antoine Laurent Lavoisier and the chemical analysis of minerals

Louise Palmer, salzerhouse@aol.com. History, Fairfield University College of Arts and Sciences, Fairfield, Connecticut, United States

On July 3, 1764 Jean Antoine Lavoisier (1743-1794) climbed the stairs in his family's Parisian home and placed vials of gypsum to crystallize in the warmth of "mother's little attic." This simple act connected him to a reform movement in French mineralogy led by the

philosophe Baron d'Holbach (1723-1789) and a group of academicians and *savants* at the*Palais Royal*. These reformers argued that applying chemistry to mineralogy would fulfill the Enlightenment goal of using science and technology for the benefit of the nation. Members spread their message through the *Encyclopédie* and translations of Swedish and German texts. Jean-Étienne Guettard (1715-1786), a long-time resident at the *Palais Royal*, drew on decades of field observations in his call to replace the usual method of analysis (subjecting the solid mineral to intense heat) with the analysis of minerals dissolved in water. As Guettard's protégé, Lavoisier carried out the research program designed to emulate the ideal practice of a reformed mineralogy. Between 1765 and 1768 Lavoisier applied his newly acquired chemical knowledge to the study of minerals dissolved in water, intending to identify the component parts of minerals and understand their etiology of formation in "Nature's laboratory." In this paper I will illustrate that Lavoisier's chemical work between 1764 and 1768 originated in the French effort to reform mineralogy. I will use Lavoisier's first laboratory notebook, his manuscripts, and the memoirs he presented to the Academy to describe his research program and its place in Guettard's scientific life cycle. I will use the *Encyclopédie* and contemporary mineralogy texts to demonstrate how the Baron d'Holbach and the members of the scientific entourage at the *Palais Royal* influenced Lavoisier's early scientific work.

Paper ID 3755006

History of the Malta Conferences: Building bridges for Peace in the Middle East

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Following the 911 tragedy in New York, the American Chemical Society through the guidance of Dr. Zafra Lerman, developed a plan which they hoped would help to prevent further terrorist attacks on the United States. The plan involved bringing scientists from Middle Eastern Countries together in a conference type setting in order that they might develop scientific collaborations to solve problem unique to their geography. It was hoped that as the scientists worked together and formed common bonds that they would be in a position to influence their governments to form diplomatic relationships with one another and with the United States and thus begin the process of working toward world peace. The plan included not only bringing scientists together but also Nobel Laureates who were in a position to bring prestige to the proposed conferences and also influence governments to send their scientists to the conferences to work with Nobel Laureates. The initial conference was held in Malta in 2003 and was supported by the American Chemical Society, The British Royal Society of Chemistry, and the German Chemical Society, The International Union of Pure and Applied Chemistry and others. The first conference was held in Malta brought together scientists from 14 Middle East countries (Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Palestinian Authority, Qatar, Saudi Arabia, Turkey and United Arab Emirates), creating a nucleus of scientists who are not typically able to attend the same meeting. Many are in positions to influence policy in their home countries. Thus

the beginning of the Malta Conferences and since that time there has been 8 other conferences. In order to support the Malta Conferences and to increase the scope and depth of them, the Malta Conference Foundation (MCF) was created in 2011 and Dr. Zafra Lerman serves as the President of MCF. This Presentation will discuss the collaborations and activities which have resulted from these conferences and the impact the Malta Conferences are having on world peace and diplomacy and the leadership roles that American Scientists have assumed in this process.

Paper ID 3757829

Sir Christopher Ingold's contributions to organic chemistry

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Christopher Ingold was born on October 28, 1893, in London. While in secondary school at Sandown, he obtained a county scholarship to study at Hartley University College in Southampton. After receiving his BSc degree, he moved to Imperial College London, and in 1914 he joined the group of Jocelyn Thorpe. In 1915, he worked in Glasgow to prepare gases for chemical warfare. In 1920, he returned to Imperial College as a demonstrator, and he had his research laboratory. Due to his impressive publication record, in 1922, he was promoted to a lectureship and received a DSc (doctor of science) degree and received the Meldola Medal. In 1924, he was elected to fellowship of the Royal Society and became a professor at Leeds University in the UK. In 1930, Ingold moved from Leeds to a professorship at the University College of London and spent the rest of his scientific career there. Sir Christopher Ingold's contribution to organic chemistry is present in every organic chemistry textbook, but students learning organic chemistry do not know his name. Ingold described the two types of nucleophilic substitution (SN1 and SN2) for the first time. During and after World War II, Ingold's contribution to organic chemistry started to be recognized. He published "Structure and Mechanism in Organic Chemistry" book in 1953. Following the publication of this important organic chemistry book, he received a few medals, awards, and honorary degrees. He was knighted in 1958. The Cahn Ingold Prelog (CIP) method was published in 1956, and it is still used in organic chemistry to name the stereoisomers of a molecule. Sir Christopher Ingold became a fierce rival to famous organic chemist Robert Robinson.

Paper ID 3750816

Lev Aleksandrovich Chugaev (1874-1922): Bridging organic and inorganic chemistry

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Lev Aleksandrovich Chugaev was born to Anna Dmitrievna Glika (1846-1879), the ex-wife of Dmitrii Alekseevich Ipat'ev, making her the mother of another eminent Russian organic chemist, Vladimir Nikolaevich Ipatieff (1867-1952). Chugaev matriculated from the 4th Moscow Gymnasium and entered the Physics-Mathematics Faculty of Moscow University in 1891. Before his graduation in 1895, he had begun to work with Nikolai Dmitrievich Zelinskii (1861-1953), and had published a paper in the *Berichte*. After his graduation (first degree), he was retained by Zelinskii to train for the professoriate, and received an appointment as an assistant dissector in the Bacteriological Institute, a position he retained until 1904. In 1900, Chugaev joined the ranks of Privat-Docents at Moscow University. He defended his *Magistr Khimii* dissertation in 1903, and his *Doktor Khimii* dissertation in 1906. In 1908, he moved to St. Petersburg as Extraordinary Professor of inorganic chemistry, and was promoted to Professor in 1911. His studies of compounds of platinum group metals led to thim becoming a founder and (from 1918) Director of the Institute for the Study of Platinum and Other Noble Metals. His scientific legacy straddles organic and inorganic chemistry: to organic chemistry, he bequeathed the xanthate pyrolysis that bears his name, and hsi work with metal complexes yielded, among others, dimetghtylglyoxime as a quantitative reagent for nickel. Ther career and legacy of this important chemist will be discussed.

Paper ID 3750849

Celebrating the sesquicentennial of the birth of Mikhail Semyonovich Tsvet (1872-1919), the father of chromatography

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The Italian-Russian botanist, Mikhail Semyonovich Tsvet (Tswett, 1872-1919) made his most lasting contribution to chemistry with his invention of chromatography in 1900. Tsvet was born in Asti, Italy, His father, Semyon Nikolaevich Tsvet (1829-1900) was a member of the Russian foreign service. His mother, Maria Nikolaevna de Dorozza (b, 1846), was Italian, but had lived much of her life in Russia. Tsvet's birth was premature and difficult, and Maria Nikolaevna died shortly afterwards. Tsvet's father took his baby son to Lausanne, where he was raised by a nurse. In 1885, he moved to Geneva, where he entered the Gymnasium, graduating in 1891. He entered the University of Geneva, where he took his Bachelor's degree in Physics and Mathematics. He changed course upon graduating and took his Ph.D. in botany, in 1896. That year, his father was recalled to Russia, so he moved to St. Petersburg, where he worked five years in the Biological Laboratory of the Russian Academy of Sciences. In 1899 he passed the examinations for the degree of *Magistr* at Kazan University, qualifying him for a tenurable faculty position in a Russian University.

Tsvet first invented chromatography in 1900, while studying plant pigments, and he made the first formal report a year later, although the publication of his paper did not occur until 1905-1906. Tsvet's work and career will be discussed.

Paper ID 3754140

Chicago-area chemists collaborate on accolades and cash for Madame Curie

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Marie Curie's visit to the United States in May and June of 1921 was well documented at the time in news outlets and the scientific press. Perhaps less well known are the identities and experiences of the chemists who helped make her brief stay in Chicago a memorable one. In addition to receiving a pair of honorary degrees from the University of Chicago and Northwestern University, Curie was awarded the Gibbs Medal for her 1898 discovery of radium, which, according to the May 1921 issue of *The Chemical Bulletin*, "opened an entirely new era of science. She penetrated what had been considered the ultimate limits of material philosophy." Despite a loyal effort to fully embrace these honorifics, however, "Marie ne parvient pas à practiser avec la gloire," according to one of her daughters who later recalled their time in America (*Marie Curie*, by Eve Curie, 1939, abridged). This talk will describe the behind-the-scenes drama that unfolded during the Gibbs banquet, as well as highlight the role of Chicago's college women who participated in a nation-wide effort to raise funds toward the purchase of 1 gram of radium for Curie's research program back in Paris. N.B.: Attendees at this talk are encouraged to wear their Ra and Po element pins.

Paper ID 3755229

More than 125 years of chemistry in Chicago: A history of the Chicago Section ACS

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Chicago has been an exciting place for chemistry for well over a century, and since 1895 the Chicago Section of the ACS has been a vital hub of the enterprise. In this talk we explore and celebrate the Section's history and some of its most important people, institutions, projects, awards, and science. We will delve into stories that illustrate the Section's roles partnering with local institutions in education, industry, and others. Also, we will pay particular attention to how the Section has addressed social issues such as empowering women and people of color. Photos from the curated Section archive will help bring the discussion to life.

Logo for the Chicago Section of the American Chemical Society

Paper ID 3740526

How the Chicago section helped desegregate National ACS Meetings

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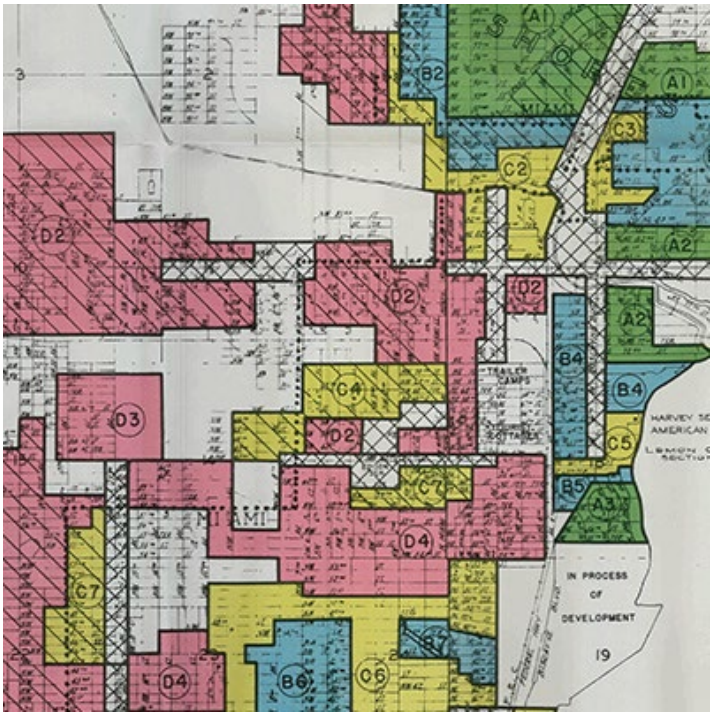
National ACS meetings have never been racially segregated themselves, but for a significant fraction of the 20th century they were sometimes held in cities where segregation was legally enforced. Even if all chemists were welcome to congregate at conferences in segregated cities, Black chemists were prohibited from many hotels, restaurants, forms of transportation, etc., severely inhibiting their participation in the professional society. In 1957, the Spring ACS Meeting was scheduled to be held in Miami, FL, which was racially segregated at the time. Substantive objections to the location were not made in time to change the venue, but interest grew around the country to prohibit ACS from locating meetings in segregated cities going forward. Taking formal action at the Spring 1957 ACS Council meeting, Chicago Section Councilor Herman S. Bloch introduced a resolution to the ACS Council that would have prohibited ACS from planning future meetings to be located in racially segregated cities. Remarkably, Bloch's resolution DID NOT PASS! The Council voted only to table the resolution for a later time. Following that disappointing vote, Bloch led a team of Chicago Section members to conduct a a more forceful effort, including a national survey of race-related attitudes among ACS members, thus capturing a remarkable snapshot of this aspect of chemists' lives in 1957. This talk will cover the growth in demand to eliminate formally segregated cities as ACS national meeting locations, the actions taken around the nation because of events surrounding the 1957 meeting in Miami, the results of the "straw poll" on race-related opinions conducted by the Chicago Section, and assessment of the efforts' impact.



Portion of 1938 Home Owners' Loan Corp map of Miami, reflecting racial redlining practices.

Paper ID 3750614

Suitability of historic glasses for chemical glassware: Using modern compositional relationships to predict properties of 15th-18th century glasses

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Although the application of glass to chemical apparatus is thought to date to at least the first century CE, its initial use was severely limited due to the low chemical and thermal stability of early soda-lime glass. This began to change in the 13th century, when the prospering Venetian glass industry developed an improved glass that allowed greater expansion of applications to chemical apparatus. The continued evolution of glass technology eventually resulted in what has been described as a "glassware revolution" in the 19th century, in which chemical practice ultimately transitioned to the modern view of the laboratory equipped primarily of chemical glassware. Using various published chemical archaeological data of glass artifacts, the chemical composition of various historic glasses will be compared in order to evaluate their expected chemical and physical properties, including chemical durability, thermal expansion, density, and thermal conductivity. Specific glass of focus will begin with pre- and post-Venetian glass, continue with various later European glasses, before concluding with Bohemian glass, which is largely believed to be the most suitable glass for chemical apparatus prior to the discovery of modern borosilicate glass. Such an analysis should allow evaluation of the respective suitability of these various

glasses for application to chemical glassware, as well as highlight limitations of glass apparatus of specific time periods.

Paper ID 3744391

Fluids under fire: Robert Boyle on distillation, elements, and particles

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In his *Sceptical Chymist* (1661) Boyle attacked scholastic and alchemical matter theories through a critical evaluation of distillation practices, known as 'fire analysis'. Boyle advanced a twofold critique of elements as primary constituents of matter – whether the four ancient elements, the three Paracelsian principles (*tria prima*: salt, sulfur, mercury), or combinations thereof, commonly identified with products of fractional distillation – and of 'fire analysis' as their ultimate experimental-empirical manifestation. Distillation, particularly of animal and plant matter, tended to produced five distinctive fractions that were associated with an elemental pentad consisting of the *tria prima* alongside earth and water, the two tangible ancient elements. The belief in the analytical power of fire was in part a vestige of notions rooted in antiquity and medieval/Renaissance iatrochemistry, which emphasized fire's unique capacity to purify, perfect matter, and isolate its various essences. In principle, Boyle admitted only mechanistic explanations based on particles, motion, and the corpuscular textures. On an operative level, however, he employed "intermediate" and "subordinate" causes, qualities, and states such as heat, fluidity, fermentation, others. Distillation often provided a prime site for the empirical determination of such causes, whereby fluids/liquids were produced out of (mainly) liquids through the action of fire, itself a fluid-like agent in Boyle's cosmology. Boyle's intermediate-level operative epistemology was a liberating compromise that allowed him to stay committed to reductive mechanism at the micro-level while deriving conclusions from qualitative (and sometimes quantitative) observations at the macro- and cosmo-levels. The four elements were a fundamental part of this tripartite scheme, as was the conception and organization of substances along a spectrum spanning from solid-cold to fluid-hot. I will discuss some of the ramifications of these issues and their relation to distillation – the single most iconic practical tool in the arsenal of early modern chymists – and its increasingly controversial status in chymistry from Boyle onwards.

Paper ID 3751849

Antoine Lavoisier's refutation of the sedimentation of water

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In 1770, Antoine Lavoisier published *Sur la nature de l'eau* – a paper that challenged a prevailing view of chemists: the transmutability of matter. Specifically, chemists such as Van

Helmont, Robert Boyle, and Ole Borsch noted that when distilled water was heated in a glass vessel a small amount of residue remained, which they held to be a transmutation of water into “earthy” matter—a theory-laden conclusion on their part. Monsieur Lavoisier designed an experiment to determine whether it was to the “destruction of a portion of the water that this [residual] earth owed its origin, or if it was to that of the glass.” Note that his experimental set-up was free from the aforementioned chemists’ theory-ladenness. From this, he was able to establish standards of purity for the types of water and glass vessels used in chemical experiments. This paper examines how such standards came to be based off of his experimental trials.

Paper ID 3752416

Glass for chemistry and the chemistry of glass: A kaleidoscopic story

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2022 is the United Nations International Year of Glass, celebrating the role of this material in our societies. The transformation of humble substances into something beautiful and precious, glass represents one of the most mesmerizing of man-made materials. Its properties puzzled natural philosophers since its inception, while the chemical reactions behind its colour changes formed the basis of the emerging alchemical discipline, in the 3rd century AD. But on top of being a wonder, glass also established itself as an ideal material in al/chemical operations, and glass distillation vessels eventually became the most iconic of laboratory apparatus. This paper explores the dynamic relationship between glass and chemistry in the early modern period, and it does so by telling two stories, seemingly distant but connected through glass. It will move between an alchemical laboratory in 16th-century Austria, where minerals were tested, and the basement laboratory at London’s Royal Institution, where Michael Faraday experimented with glass making in the 1820s. Making use of material and documentary evidence, the paper exposes how glass was both a carrier of chemical knowledge and the key tool through which more knowledge could be built, reinforcing once again its pivotal role in the history of chemistry.

Paper ID 3740389

Antoine-Laurent Lavoisier and glassmaking

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After the discovery of the active role of gases in chemical reactions, laboratory equipment underwent a radical change and many new instruments, apparatus and machines were devised. Glassware in particular became of central importance and, between 1760 and 1790, chemists introduced several new types of glass recipients, balloons and apparatus

that helped them to manage the analysis and manipulation of airs. As glass artifacts were produced by the members of well established guilds, their variety and quality responded to the demand of the market and not to the specialized needs of the chemical laboratory. It was in this context that several chemists began to make glassware on their own. Lavoisier was among those and he built a small glasswork in his laboratory at the Arsenal for this purpose. In my paper I shall illustrate what is left of this workshop and I shall examine a few examples of his glass apparatus.

Paper ID 3743923

Chemical bulletin by the Chicago Section ACS: Engaging chemists for over one hundred years

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A variety of historical treasures are found in the 109 volumes of *The Chemical Bulletin*, the newsletter of the Chicago Section of the American Chemical Society. Originally titled *The Chicago Chemical Bulletin*, our publication predated C&EN's earliest incarnation by nine years and continues to serve much the same function: reporting news about the chemical enterprise; celebrating chemists' achievements; presenting feature articles interesting to chemists, including chemistry educators; providing chemists a forum to share opinions and debate; supporting outreach to the public and elected officials; indulging in niche chemistry humor; etc. In this poster we showcase certain aspects of The Chemical Bulletin's history that its recent Editors and contributors have found appealing, including the following:
-Its function as an early regional "social network" for chemists, sharing promotions, patents, degrees, positions sought, marriages, births, etc. from the Chicago Section and several of its neighbors, including Iowa, Wisconsin, Milwaukeee, Illinois, and more.
-Chemistry-themed artwork, especially original rubber stamps and the integration of art into the National Meetings.
-Discussion and debate in opinion and letters section on pressing matters of the day, such as chemists' roles in WWI and WWII, the influence of communism and the Red Scare on the enterprise, and more.
-Its function as a lens providing insights into women's role in chemistry over the course of more than a century, tracking the evolution of focus from "household chemistry" to professional employment in industry, agriculture, medicine, and education to issues like compensation equity.

The poster itself will provide QR codes to pages on chicagoacs.org that allow the reader/viewer to explore these aspects of the Bulletin Archives in more detail.

Mastheads of the Chicago Section's newsletter, The Chemical Bulletin, from 1914 through present day.

Paper ID 3742000

Photographic private insights into historic Gibbs medal ceremonies

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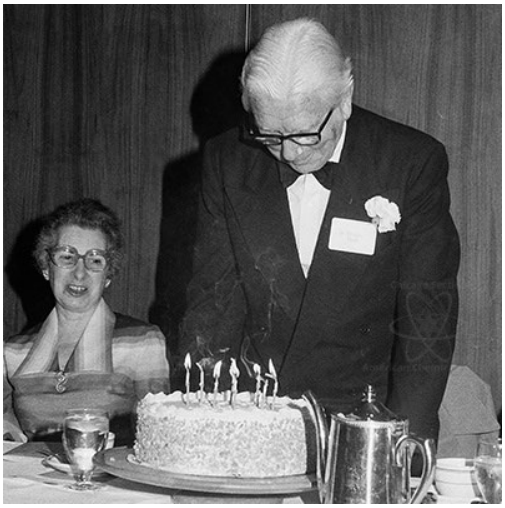
The Willard Gibbs Medal, given by the Chicago Section of the ACS, is one of the most prestigious awards in chemistry, established *"To publicly recognize eminent chemists who, through years of application and devotion, have brought to the world developments that enable everyone to live more comfortably and to understand this world better."* First given to Svante Arrhenius 1911, the medal is presented in an annual ceremony involving a sumptuous reception, banquet, lecture by the eminent scientist, and presentation, usually by the ACS President or President-Elect. Attendees usually include an array of luminaries including former Gibbs Medalists, ACS leadership, and other top chemical minds. Photographs taken at Gibbs ceremonies have captured a wealth of insightful personal moments not normally recorded in published archives. Among others, this poster will show:
- At least two medalists celebrating birthdays at their award banquets.
- Happenstance collisions of great chemists who influenced each others' science.
- Medalists with their children, who may have been inspired themselves.
- Attendees exhibiting fashion and other elements of style from different decades
Photos of historic documents will also show intriguing stories. For example,
- The letter from the Chicago Dept. of Public Health the year that many attendees came

down with food poisoning.
- Handwritten letters of appreciation from medalists.

This poster will showcase a curated selection from the Chicago Section archives and provide links to their stories.



1975 Willard Gibbs Medalist Herman Mark celebrates his birthday at his Gibbs Ceremony in Chicago.