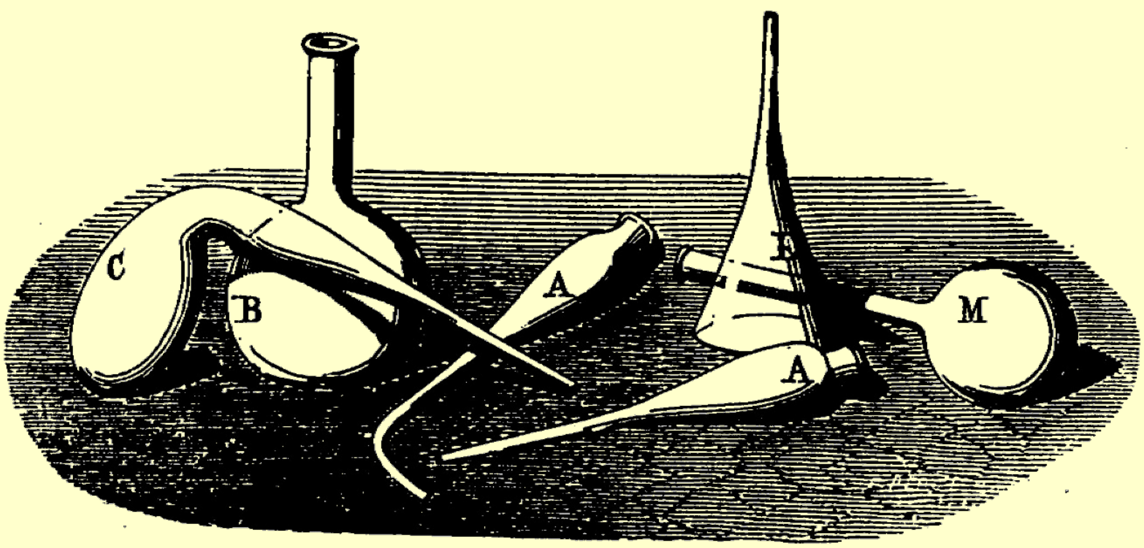
American Chemical Society

DIVISION OF THE HISTORY OF CHEMISTRY



PROGRAM & ABSTRACTS

263rd ACS National Meeting
San Diego, CA (Hybrid)
March 20-24, 2022

Nicolay V. Tsarevsky, Program Chair

Officers - Division of the History of Chemistry

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
Email: seth.rasmussen@ndsu.edu

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

Past Chair: Daniel Rabinovich
Department of Chemistry
UNC Charlotte
9201 University City Blvd.
Charlotte, NC 28223
Phone: 704-687-5105
Email: drabinov@uncc.edu

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

Program Chair: Nicolay V. Tsarevsky
Department of Chemistry
Southern Methodist University
3215 Daniel Avenue
Dallas, TX 75275
Phone: 214-768-3259
Email: nvt@smu.edu

Associate Program Chair: Mihaela C. Stefan
Department of Chemistry and Biochemistry
University of Texas at Dallas
800 West Campbell Road
Richardson, TX 75080
Phone: 972-883-6581
Email: mihaela@utdallas.edu

***Bulletin* Editor**: Carmen J. Giunta
PO Box 522
Manlius, NY 13104
Phone: 315-632-4992
Email: giunta@lemoyne.edu

Councilor: Mary Virginia Orna
ChemSource, Inc.
39 Willow Drive
New Rochelle, NY 10805
Phone: 914-310-0351
Email: maryvirginiaorna@gmail.com

Councilor: Roger A. Egolf
Pennsylvania State University - Lehigh Valley
Campus, 2809 Saucon Valley Road
Center Valley, PA 18034
Phone: 610-285-5110
Email: rae4@psu.edu

Alternate Councilor: David E. Lewis
Department of Chemistry and Biochemistry
UW-Eau Claire
PO Box 4004
Eau Claire, WI 54702
Phone: 715-836-4744
Email: lewisd@uwec.edu

Alternate Councilor: Christopher L. Heth
Division of Science
Cyril Moore Science Center, Rm 331
Minot State University
500 W University Ave.
Minot, North Dakota 58703
Phone: 701-858-3084
Email:christopher.heth@minotstateu.edu

Historian: Gary Patterson
3725 Wauna Vista Drive
Vancouver, WA 98661
Phone: 412-480-0656
Email: gp9a@andrew.cmu.edu

Archivist: John Sharkey
1559 Grouse Lane
Mountainside, NJ 07092
Phone: 908-654-3432
Email: johnbsharkey@me.com

Communications Chair: Kristine Konkol
Department of Natural Sciences
Albany State University
504 College Dr.
Albany, GA 31705
Phone: 229-500-2316
Email: kristine.konkol@asurams.edu

HIST Programming

Message from the HIST Program Chair

Once again, it is my pleasure and privilege to welcome you to the National ACS Meeting and HIST – arguably the most interdisciplinary division of the Society. This time we will meet in San Diego. I hope that all in-person attendees will not only take advantage of the possibility to talk to like-minded individuals throughout the day, without having to rely on stable and fast Internet connection or high-resolution cameras but will also have the chance to experience this beautiful city. The virtual-only attendees and presenters should not despair, however, for they will still be able to enjoy the high-quality programming. Of course, we all eagerly anticipate a future when the pandemic and all restrictions related to it will belong in the history books but, in the meantime, having the chance to exchange ideas virtually, should not be underestimated.

On behalf of the Division and the presenters, I invite you to join as many as you can of our technical sessions. I know the contents and the quality of the lectures will keep you engaged, and you will retain great memories from the meeting and your interactions with other HIST members and friends. We will start on Monday with two – morning and afternoon – General Papers sessions. A great assortment of interesting topics will be offered. Diversity there will be but, if you feel that some subjects that you find important or even necessary were not covered, remember that we will continue to embrace suggestions as well as new speakers willing to participate in our events. We will continue on Tuesday with the HIST Award Symposium honoring Mary Virginia Orna. She has written multiple articles and books on chemistry and its history, and on the connection between art and chemistry. They have taught generations of students and educators, and have inspired many to develop their own activities and courses, or even to choose chemistry as a career. Bringing our discipline to the public is of paramount importance and Mary Virginia has indeed excelled in accomplishing that. The spectrum of her contributions is truly broad and colorful, and I invite you to attend the sessions and perhaps say hello to an exceptional individual, such as Mary Virginia, and meet some truly outstanding speakers. The schedule of our symposia and the abstracts are given on the subsequent pages.

This *Newsletter* is somewhat unusual in terms of its contents. As I mentioned in previous issues, the *Elemental Art Contest*, which was initiated in 2019 as a celebration of the 150^{th} anniversary of Mendeleev's publication of the Periodic Table, concluded, after extending the original deadline, at the end of April 2021. We received 60 original artworks and the winners were already selected, notified, and awarded certificates and/or monetary awards. HIST's own Mary Virginia Orna and Art Greenberg kindly agreed to co-chair the awards committee and I thank them and the judges for their hard work. It was not easy to select from a large number of inspired, high-quality, works. Above all, I use the opportunity to express my deepest gratitude to all competitors for creating beautiful and inspiring art and – importantly – for being willing to share their works. Now, with the kind permission of the authors of the prize-winning poems, cartoons, and photograph, you can enjoy those artworks. My hope is that this competition will serve to encourage more talented individuals with interest in chemistry or science to create art. The history of chemist-artists is long and glorious, and I am certain the list will continue to expand.

Enjoy our program and the rest of the ACS meeting. As ever, I ask you to please share what you know about HIST with your friends, coworkers, and students. Be well and I look forward to hearing from you or seeing you soon!

Nick Tsarevsky, HIST Program Chair

HIST SYMPOSIA, 263rd ACS Meeting, March 20-24, 2022

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

HIST Award Banquet

As part of its activities at the 263rd ACS National Meeting in San Diego, the History of Chemistry Division of the American Chemical Society is pleased to host the 2021 HIST Award Banquet honoring Dr. Mary Virginia Orna of Chemsource, Inc. The Banquet will be held at Casa Guadalajara (http://www.casaguadalajara.com/) on Tuesday, March 22. It will start at 7:00 PM and will feature a buffet dinner (the Fiesta Fajita option) and a cash bar. **Tickets are $50 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 and coffee are additional 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 March 18th (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.

264th ACS Meeting, Chicago, IL, August 21-25, 2022

HIST Award Symposium (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

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

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

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

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

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, March 20, 2022: Evening

Location: Aqua 303 (Hilton San Diego Bayfront)

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

Monday, March 21, 2022: Morning session (8:00 am – 11:15 pm PDT)

Section A

Location: Sapphire C/D (Hilton San Diego Bayfront)

General Papers and Tutorial: Materials and Tools
Nicolay Tsarevsky, *Organizer*, Presider; Mihaela Stefan, *Presider*

08:00 Development of writing materials from Mesopotamia to the modern era. **Kristine Konkol**

08:30 Three colorful chemicals that generated and protected the earliest art. **Benjamin McFarland**

09:00 Cellulose solutions: Early discoveries and applications. **Nicolay Tsarevsky**

09:30 Intermission

09:45 Discovery of the element nipponium in 1908 and its re-assignment to rhenium. **Yoshiteru Maeno**

10:15 Use of performance enhancing drugs by East German athletes in the olympic games from 1974 to 1988. **Courtney Temple, Aaron Roerdink**

10:45 Recreating crystal model kits from the 19th century using 3D printing. **James Mendez**

Monday, March 21, 2022: Afternoon session (2:00 – 4:40 pm PDT)

Section A

Location: Sapphire C/D (Hilton San Diego Bayfront)

General Papers and Tutorial
Nicolay Tsarevsky, *Organizer*, Presider; Mihaela Stefan, *Presider*

02:00 Controversial Arthur Rudolf Hantzsch and his polemics. **David E. Lewis**

02:30 Alexander Smith, an American chemist and chemical educator. **William P Palmer**

03:00 Contributions of Sir William Ramsay to chemistry. **Pete Villarreal, Tristan Ornelas, Christine Hahn**

03:30 Intermission

03:40 Exploring the evolution of collegiate general chemistry using historical texts. **Rebecca Jones, Kiran Zaidi**

04:10 Review of first issue of The Nucleus of the northeastern section. **Craig Sergeant, Morton Hoffman**

Tuesday, March 22, 2022: Morning session (8:00 am – 12:00 pm PDT)

Section A

Location: Sapphire C/D (Hilton San Diego Bayfront)

HIST Award in Honor of Mary Virginia Orna
Jeffrey Seeman, *Organizer*; Nicolay Tsarevsky, *Presider*

08:00 Introductory remarks. **Jeffrey Seeman**

08:05 Margaret S. Collins, Termites and Chemical Defense. **Sharon Haynie**

08:30 New colorful world: Georges Urbain, the red star, who disappeared off the horizon. **Marco Fontani, Mary Virginia Orna, Marigrazia Costa**

08:55 Who discovered radon? The case in support of Robert Bowie Owens (1870-1940). **Gregory Girolami**

09:20 History of the development of the Woodward-Hoffmann rules: A panoply of stories. **Jeffrey Seeman**

09:45 History of chemistry in the Journal of Chemical Education. **Carmen Giunta**

10:10 Intermission

10:20 HIST and the Center for the History of Chemistry (now Science History Institute): Lasting bonds. **Mary Ellen Bowden**

10:45 Bringing chemistry to reality for students, teachers, chemists, and the general public. **Janan Hayes**

11:10 Caddo Nation chemistry: Art, commerce, pottery, and tools. **Joe Jeffers**

11:35 John Mercer, the most colorful chemist of the 19th century. **Gary Patterson**

Tuesday, March 22, 2022: Afternoon session (2:00 – 6:00 pm PDT)

Section A

Location: Sapphire C/D (Hilton San Diego Bayfront)

HIST Award in Honor of Mary Virginia Orna
Jeffrey Seeman, *Organizer*; Roger Egolf, *Presider*

02:00 Introductory remarks. **Jeffrey Seeman**

02:05 Boon or bane? Color and transparency in early silica glass. **Seth Rasmussen**

02:30 "Chemical history of color," but just two kinds of them. **David E. Lewis**

02:55 Emilio Noelting, the Mulhouse chemistry school, and the development of rational dye chemistry in the Rhine region. **Arthur Greenberg**

03:20 Pattern papers of William Henry Perkin. **Vera V Mainz, Gregory Girolami**

03:45 Intermission

04:00 Philatelic tribute to a most valuable organizer (MVO). **Daniel Rabinovich**

04:25 Seraph of the Edelstein Center. **Zvi Koren**

04:50 Mvo and chemsource. **Patricia Smith**

05:15 Truly, and necessarily, on the shoulders of giants: An astonishing historic journey. **Mary Virginia Orna**

05:55 Concluding Remarks. **Jeffrey Seeman**

ABSTRACTS

Paper ID: 3660233

Development of writing materials from Mesopotamia to the modern era

Kristine L. Konkol, kristine.konkol@asurams.edu. Department of Natural Sciences, Albany State University, Albany, Georgia, United States

The advent of the written word and the development of the materials on which those words were written has had a vast impact on the development of our modern society. One could make the argument that without the tools to keep written records, chemistry and chemical ideas would never have proliferated across the globe and flourished as it does in the current age. The methods by which knowledge have been recorded have changed both by time period and geographical region, and have included substrates of recording such as clay tablets, papyri, bamboo slips, parchment, and paper. Local availability has historically driven the usage of different writing materials, with multiple types of writing materials sometimes being used concurrently in the same geographical areas. An overview of the historical evolution of writing materials will be examined, from the initial development of various materials to their ultimate extinction. This discussion will encompass the worldwide development and use of popular substrates to record written records, from clay tablets in the 4th century BCE in Mesopotamia to the dominance of paper in the modern era.

Paper ID: 3662057

Three colorful chemicals that generated and protected the earliest art

Benjamin J. McFarland, bjm@spu.edu. Chemistry and Biochemistry, Seattle Pacific University, Seattle, Washington, United States

The chemical properties of red iron oxide, white calcite, and black charcoal interacted through geological processes and human action, in order to create and preserve prehistoric art. These processes center on iron oxide's bright red color, as one of the first pigments humans mined and processed for use in art. This color was used by our ancestors across the globe in the earliest known examples of art:

1. At Blombos Cave in South Africa, the smooth surface of a 73,000-year-old silcrete flake displays nine straight lines, drawn with a red ochre iron oxide "crayon." The flake appears to have come from a grindstone for ochre processing at a "workshop" in the cave, where the ochre pigment was stored with charcoal from the fires of processing and other materials in an abalone shell, containing calcite.

2. At multiple caves in Indonesia, cave walls retain red and purple ochre paintings of animals and handprints dated at far back as 40,000 years ago, making them the oldest known at present. The red and purple pigments may differ in color because of mechanically-induced alteration from early chemical practices. This art was preserved by thin layers of translucent calcite produced by the dissolving and precipitation of calcium minerals, which also allowed Uranium-series dating to surpass previous C-14 dating of charcoal in the region.

3. A submerged cave system near the east shore of the Yucatan Peninsula, Mexico, retains no ancient art, but rather an ochre mine and factory. Geological processes created soil-pipe deposits both carried and covered by shifting calcite flowstone. From about 12,000 to 10,000 years ago, miners extracted red ochre from these dangerous caves, some losing their lives in the process. The ochre was processed *in situ* using wood fire and broken-off speleothem as hammerstones, leaving some charcoal to be sealed by flowstone and allowing chronological reconstruction. The dynamic flowstone and flooded chambers hid this mine until a few years ago.

Geological processes produced and revealed the iron oxide, and humans processed it into a pigment through grinding and the heat supplied by charcoal. Calcite's abundance and solubility in water protected this ochre in different ways until these artifacts or sites were discovered in the 21st century. Despite widely separated locales, these ancient chemists and artists employed similar techniques, places, and colors, because of the chemical properties of iron oxide and calcite.

Paper ID: 3640773

Cellulose solutions: Early discoveries and applications

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

In the 19th Century, numerous efforts were made to dissolve cellulose and examine (and find applications of) the formed solutions. Some of the early attempts involved chemical transformations (e.g., nitration and later acetylation) of the natural polymer, which afforded soluble cellulose derivatives. Regeneration of cellulose was not possible in these cases. The preparation of solutions of cellulose, from which it could be isolated unchanged, proved more challenging until 1857 when the Swiss chemist Eduard Scweizer (1818–1860) reported that the dark blue solutions formed by the reaction of copper(II) compounds with excess of strong ammonia dissolved efficiently plant fibers. It was ascertained that when the solutions of cellulose thus prepared were added to acids, cellulose precipitated again – a process, which served as the basis of the viscose process for production of cellulose (rayon) fibers, patented in 1890 by the French chemist Louis-Henri Despeissis. In 1892, another important finding was patented by Charles Frederick Cross (1855-1935), Edward John Bevan (1856-1921), and Clayton Beadle (1868-1917), namely the dissolution of cellulose in carbon disulfide in basic media with the formation of soluble cellulose xanthate, which could then be easily converted (by acidic hydrolysis) again to cellulose. The early research on cellulose solutions and their uses in the production of fibers ("artificial silk") and films will be described.

Paper ID: 3655998

Discovery of the element nipponium in 1908 and its re-assignment to rhenium

Yoshiteru Maeno, maeno@scphys.kyoto-u.ac.jp. Department of Physics, Kyoto University, Kyoto, Japan

We re-examine the history of the element “nipponium” discovered by a Japanese chemist Masataka Ogawa in 1908. Since 1996 H.K. Yoshihara has made extensive research into Ogawa’s work and revealed evidence that nipponium proposed for the place of the atomic number of 43 was actually rhenium (75). In this presentation, we provide critical re-interpretations of the existing information and confirmed that Ogawa left indisputable evidence that nipponium was in fact rhenium. We further discuss the reasons for the existing doubts and criticism against Ogawa’s discovery and Yoshihara’s interpretation, and attempt to resolve them. This work is done in collaboration with Yoji Hisamatsu and Kazuhiro Egashira.

Paper ID: 3651296

Use of performance enhancing drugs by East German athletes in the olympic games from 1974 to 1988

Courtney Temple, ctemple@heidelberg.edu, Aaron R. Roerdink. Department of Chemistry and Biochemistry, Heidelberg University, Tiffin, Ohio, United States

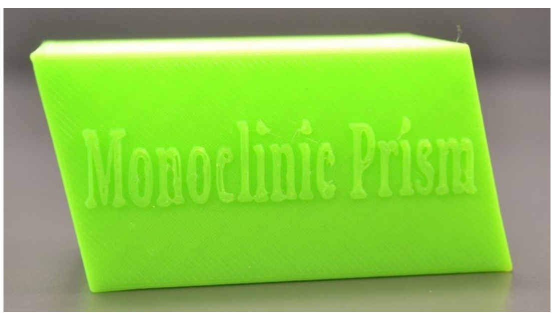
In 1967 the International Olympic Committee began to ban the use of performance enhancing drugs (PEDs) and integrated mandatory testing of athletes participating in the Games. Over the course of the next several years, the list of banned substances expanded to include anabolic steroids (1975). Beginning with the 1976 Olympics, East German athletes began to dominate the Games. No East German athletes tested positive during the Olympic Games from 1976 to 1988 even though evidence from after the fall of the Berlin Wall confirms the use of PEDs. World and national records in track and field set by East German athletes still stand today even with new training techniques and the wide range of talented athletes that continue to compete in the Games. Therefore, this project investigates East Germany’s use of PEDs from 1974 to 1988 in the Olympic Games. More specifically, this project focuses on the parallels of PEDs, the evolution of drug regulations, and how these aspects impacted East Germany’s athletic performance in track and field within the given time period.

Paper ID: 3658684

Recreating crystal model kits from the 19th century using 3D printing

James D. Mendez, mendezja@iupuc.edu. Division of Science, Indiana University-Purdue University Columbus, Columbus, Indiana, United States

To celebrate Indiana University's bicentennial, 3D printing was used to create a set of crystal models commonly made of wood and used extensively in 19th-century chemistry and geology classrooms. While wooden crystal models exist, they have fallen out of favor for many reasons, including the widespread availability of highly detailed 3D models in textbooks and the high cost. The use of 3D printing allows for these models to be made inexpensively and on-demand for specific topics. Additionally, more complex structures that would usually be prohibitively expensive were created for particular applications. Combined with existing 3D printed education tools (unit cells and molecular models), these models were used to teach a joint lesson on crystal structures and the history of models in the chemistry classroom.



Paper ID: 3660854

Controversial Arthur Rudolf Hantzsch and his polemics

David E. Lewis, lewisd@uwec.edu. Chemistry and Biochemistry, University of Wisconsin-Eau Claire, Eau Claire, Wisconsin, United States

The heterocyclic chemist, Arthur Rudolf Hantzsch (1857-1935), the discoverer of two eponymous reactions (the Hantzsch pyridine synthesis and the Hantzsch pyrrole synthesis) was a student of Rudolf Schmitt and Johannes Wislicenus. Under Wislicenus, he began a study of the stereochemistry of compounds containing N=N nonds, especially the phenylhydrzaoic acids. This involved him in a three-decade-long controversy with Eugen Bamberger (1857-1932): Bamberger did not accept Hantzsch's rationalization of that diazoic acid was the *trans* isomer, and that isodiazoic acid was the *cis* isomer. Bamberger proposed that the iso acid was actually the *N*-nitrosoamine tautomer. Hantzsch's first papers on the synthesis of thazoles brought him into another three-decade-long polemic with Russian-born British industrial chemist Joseph Tcherniac (1851-1928) over the existence of α-thiocyanatoacetone. Both these controversies descended into personal recriminations reminiscent of the Winstein-Brown polemics over the non-classical norbornyl cation of the 1960s-1970s. Hantzsc's career and interactions with his peers will be discussed.

Paper ID: 3644240

Alexander Smith, an American chemist and chemical educator

William P. Palmer, drspalmer@optusnet.com.au. STEM, Curtin University, Perth, Western Australia, Australia

Alexander Smith was born in Scotland on 11th September 1865. He graduated from Edinburgh University in 1886 with an interest in astronomy as well as in chemistry but found that there were few employment opportunities in astronomy. He obtained his doctorate from the University of Munich working under Ludwig Claisen in the Baeyer Laboratory in 1889. He worked for a year as an assistant at Edinburgh University and through some fortunate coincidences obtained a position of Professor of Chemistry and Mineralogy at Wabash College, Indiana in 1890. After four years at Wabash, he was appointed as Assistant Professor of Chemistry at the University of Chicago becoming Professor in 1903. He married Sarah Bowles in 1905 and they had two children. In 1911, he moved to Columbia University as Head of Department and Professor of Chemistry. He resigned due to illness in 1919 and died in Edinburgh on 8th September 1922. The study will concentrate on his influence on science education through his writing about teaching chemistry, his textbooks and his chemistry laboratory manuals.

Paper ID: 3668807

Contributions of Sir William Ramsay to chemistry

Pete Villarreal, pete.villarreal@students.tamuk.edu, Tristan Ornelas, Christine Hahn. Department of Chemistry, Texas A&M University-Kingsville, Kingsville, Texas, United States

Sir William Ramsay (1852-1916) was one of the greatest scientific minds of his time. Undoubtedly, he is known for the discovery of the noble gases that led to an expansion of the periodic table. While this resulted in him receiving the 1904 Nobel Prize in Chemistry, it should be noted that his work provided other great contributions to chemistry as well. This talk aims to detail his many scientific contributions, from his work on the oxides of nitrogen, to his famous collaborations with Lord Rayleigh and Morris Travers, to his later appointments and advisory roles, as well as the lasting impact his discoveries have had on modern research.

Paper ID: 3659024

Exploring the evolution of collegiate general chemistry using historical texts

Rebecca M. Jones, drrebeccajones@gmail.com, Kiran Zaidi. George Mason University, Fairfax, Virginia, United States

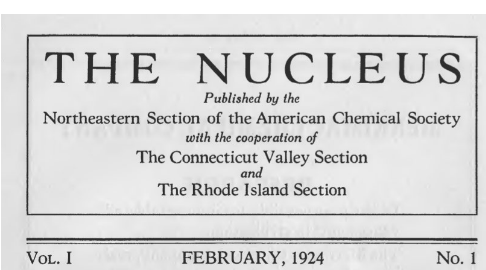
Chemistry has been taught at colleges in the United States since the late 18th century and the evolution of chemical education is of interest to science educators today. In previous work, we analyzed two primary sources from the Library of Congress; Lecture Notes from General Chemistry by Elijah Patrick Harris from Amherst College (1888) and Lecture Notes on Chemistry for Dental Students by Henry Carlton Smith from Harvard University (1917) and compared the content and topics in these sources to that which is general chemistry courses in 2021. Continuing this project, we analyzed four additional primary sources from the mid-20th century (Schoch 1946, Pauling 1954, Nebergall 1959 and Sisler 1961) and one additional source from the 19th century (Mendeleev 1868). We used Chemistry and the Molecular Nature of Matter and Change (2015) by Silberberg and Amateius and Chemistry, 6th edition (2020) by Gilbert, Kirss, Bretz, and Foster for modern camparable sources. We explored various topics relevant to collegiate general chemstry, such as the general definition of chemistry, the mathematical units used, the concepts of valence and equlibrium, and descriptions of an atom. This presentation will compare and contrast the terms and language used in the different sources and make connections to the historical development of chemistry as a science.

Paper ID: 3643330

Review of first issue of *The Nucleus* of the northeastern section

Craig D. Sergeant[1], csergeant@jeol.com, Morton Z. Hoffman[2]. (1) Jeol USA Inc, Peabody, Massachusetts, United States (2) Boston University, Boston, Massachusetts, United States

In this talk, we will review the inaugural issue (Volume I, Number 1) of *The Nucleus*, the monthly newsmagazine of the Northeastern Section of the ACS (NESACS), as we celebrate its 100th annual volume (Vol. C) in 2021-2022. We will take a look back in time to that first issue to understand better the people, places, science, and culture during the Roaring Twenties. Tales about many historical figures in chemistry and chemical companies in New England will be highlighted.


THE NUCLEUS

Published by the
Northeastern Section of the American Chemical Society
with the cooperation of
The Connecticut Valley Section
and
The Rhode Island Section

VOL. I FEBRUARY, 1924 No. 1

Paper ID: 3641487

Margaret S. Collins, Termites and Chemical Defense

Sharon L. Haynie, lorimers@earthlink.net. Hypatia Technology Works, LLC, Philadelphia, Pennsylvania, United States

This talk describes the contributions of a mid-twentieth century African-American entomology scientist, Dr. Margaret Strickland Collins. During her mid-career, Dr. Collins collaborated with chemist, Dr. Glenn Prestwich, to uncover the identity of key molecules critical to termite communication and defense from termite soldiers. This work resulted in 7 research publications co-authored by Drs. Collins and Prestwich. Their work added to the large body of literature that has revealed the mixtures of terpenes, alcohols, ketones, fatty acids and aromatic compounds that form species-special "chemotypes" in chemical defense secretions. In recent years, Dr. Collins has gained broader public recognition for her field contributions to termite science and her efforts to advance gender and racial equality.

HIST 3642428

New colorful world: Georges Urbain, the red star, who disappeared off the horizon

Marco Fontani[1], marco.fontani@unifi.it, Mary Virginia Orna[2], Marigrazia Costa[3]. (1) Department of Chemistry "Ugo Schiff", Universita degli Studi di Firenze, Firenze, Toscana, Italy (2) Chemistry, College of New Rochelle, New Rochelle, New York, United States

Few people know - and even fewer people will celebrate the fact that 2022 marks the 150th anniversary of the birth of Georges Urbain. Almost a century ago, his name was known around the world as one of the most famous living chemists. He was the doyen of the old French School of Chemistry. Rumors targeted him as the next Nobel Prize winner in chemistry for isolating several Rare Earth Elements (REE) and for the supposed discovery of *neo-ytterbium*, *lutecium*, and *celtium*. During his lifetime, he received more than 50 nominations. He was also a forerunner of modern spectroscopy and magneto-chemistry, a theoretical chemist, a keen philosopher of science, an innovative composer, a talented sculptor and even an amateur painter. The controversial figure of Georges Urbain matches his nonconformist stance, of delicate and dazzling artist, to the harsh temper of an authoritative professor. The present work will shed light on a marginal aspect of his vast but tumultuous career in science. The French academician Paul Caro once stated, “Urbain invented color TV.” We have studied the original papers of Urbain and so we will see what truth there is to this claim.

Paper ID: 3657262

Who discovered radon? The case in support of Robert Bowie Owens (1870-1940)

Gregory S. Girolami, ggirolam@uiuc.edu. Chemistry, University of Illinois at Urbana-Champaign, Urbana, Illinois, United States

In January of 1900, the New-Zealand born English physicist Ernest Rutherford (1871-1937) submitted an important paper in which he described the properties of “thorium emanation,” a mysterious radioactive substance that he concluded must be composed of “some sort of particles.” Rutherford later showed that emanation had all the properties of a gas, which we know today as radon. For this and related discoveries, Rutherford was awarded the Nobel Prize in chemistry in 1908. But Rutherford did not discover thorium emanation. In September 1898, Rutherford had been appointed as professor of physics at McGill University in Montreal, where he met the recently appointed professor of electrical engineering, the American Robert Bowie Owens. Owens was interested in the new phenomenon of radioactivity, and the two men decided to collaborate. Rutherford continued the studies of uranium salts he had started in Cambridge, while Owens tackled the newly discovered radioactivity of thorium salts. Owens’s results were the more interesting and the more puzzling: he found that the level of radioactivity of the thorium salts increased noticeably with time, eventually reaching a maximum value. Furthermore, there were sudden shifts in the ionization of the air produced by his samples. Even opening the door to the laboratory changed the results. Eventually, Owens found that passing air through the sample container caused the level of radioactivity to diminish. If instead the sample was left undisturbed, it regained its previous activity in a few minutes. Rutherford’s uranium salts showed no such variability. Owens concluded that his experiments “indicate that the cause, whatever it is, lies close to the surface of the active material. It is possible that some intense type of radiation coming from the body of a thick layer of certain salts changes the nature of their surfaces, forming in the neighbourhood a more active material which if removed from the containing vessel diminishes the amount of ionization produced.” Owens published his explanation of the unusual effect in two papers in 1899: including a single-author full paper in the *Philosophical Magazine* on his the thorium studies, probably submitted in July of 1899. Sadly, today Owens has been almost completely forgotten. The current talk will give some details of his life and argue that he is entitled to a share (at least!) of credit for the discovery of radon.

Paper ID: 3637572

History of the development of the Woodward-Hoffmann rules: A panoply of stories

Jeffrey I. Seeman, jseeman@richmond.edu. Department of Chemistry, University of Richmond, Richmond, Virginia, United States

One of the seminal achievements in 20th century organic chemistry was the formulation of the Woodward-Hoffmann rules. Beginning with five communications in the *Journal of the American Chemical Society* in 1965, R. B. Woodward and Roald Hoffmann revealed a single mechanistic explanation for all pericyclic reactions (i.e., all 'cyclic-bonding concerted

reactions). In doing so, they also initiated a revolution in chemistry: the value of an intimate, synergistic collaboration between an experimentalist and a theoretical/computational chemist. Why was it Woodward and Hoffmann, as individuals and as a team, that solved the no-mechanism problem? Was was it *not* tens of other brilliant chemists who were also so very close to the solution? Indeed, why was it *not* Luitzen Oosterhoff or Kenichi Fukui in 1961 and 1964, respectively, who first proposed orbital symmetry to explain independently the mechanisms of portions of these reactions. And what are we to make of E. J. Corey's claim made during his 2004 Priestley Medal address that Woodward stole his (Corey's) ideas that led to the W-H rules? All together, these among others form a panoply of stories that explain the progress of science and the role played by the humanness of its practitioners.

At the first Cope Award (1973): left to right: Roald Hoffmann, H. Block (ACS Board of Directors), Mrs. A. C. Cope, R. B. Woodward.

Paper ID: 3642938

History of chemistry in the *Journal of Chemical Education*

Carmen J. Giunta[1], giunta@lemoyne.edu, Martin D. Saltzman[2]. (1) Chemistry, Le Moyne College, Syracuse, New York, United States (2) Providence College, Providence, Rhode Island, United States

For many decades after its founding in 1924, the *Journal of Chemical Education* was the principal outlet for publication for American chemist-historians. In the later 1980s, one of the motivations for the Division of the History of Chemistry (HIST) to begin publishing the *Bulletin for the History of Chemistry* was the "decreasing emphasis on history of chemistry in more traditional chemical journals, such as the *Journal of Chemical Education*." Shortly thereafter, HIST published an "Index to the History of Chemistry in the *Journal of Chemical Education*, 1925-1990," prepared by Martin D. Saltzman with the assistance of Daniel A. Lombardi. This presentation will discuss highlights of the index, which is newly available on the HIST website.

Paper ID: 3656993

HIST and the Center for the History of Chemistry (now Science History Institute): Lasting bonds

Mary Ellen Bowden, mebowden1@verizon.net. Science History Institute, Philadelphia, Pennsylvania, United States

HIST is 100 this year, and CHOC under its successive names, including Science History Institute, is 40. In January 1982 the ACS and the University of Pennsylvania signed an agreement that created CHOC.Two years later the American Institute of Chemical Engineers joined CHOC as a founding member. That SHI exists today owes a lot to HIST, which served as a progenitor of CHOC by promoting to the ACS the idea of a center for the history of chemistry. In September 1979 HIST proposed such a center to the ACS's Board of Directors. In 1981 ACS President Gardner Stacy appointed a task force made up of HIST and ACS Board members to study the desirability and feasibility of such a center. Ned Heindel served as chairman, and John Wotiz played a key advocacy role. In developing their ideas members of HIST approached Arnold Thackray, founder of the department of history and sociology at the University of Pennsylvania and honorary curator of the Edgar Fahs Smith Memorial Collection. Thackray set to work drafting proposals and budgets. Charles Price, an ex-president of the ACS, joined him in these efforts and in gathering support from a number of chemical manufacturers. Thackray and Price needed their support to convince the ACS and the University of Pennsylvania of the center's economic viability. Over the years HIST and CHOC developed further beneficial relationships including Thackray's recruiting from HIST the first three editors of the center's periodical publication: Jeff Sturchio, Ted Benfey, and Mary Virginia Orna. Stalwart HIST member Sidney Edelstein was responsible for significant book donations to the center's library and he founded the first fellowships to bring in outside scholars to do their research and writing. Several more such relationships will be profiled in this talk.

Paper ID: 3647397

Bringing chemistry to reality for students, teachers, chemists, and the general public

Janan Hayes, janan.hayes@gmail.com. Project Inclusion, Syracuse, Utah, United States

A major focus in my life has been to experience chemistry in the real world. The draw to living science, and more specifically chemistry, came naturally to me as the daughter of a geologist. Fortunately, I had a wonderful high school chemistry teacher. In college, I majored in science education and continued with a research Ph.D. in inorganic chemistry. My career included 40 plus years in college teaching and administration. The constant over those years was a desire to bring real science to the classroom and to the general public. The best way that I found to do this came by experiencing chemistry in real world situations. It should be no surprise that this resulted in a variety of activities becoming part of my personal life, as well as my teaching. In my talk I would like to share some of these with suggestions for your consideration. Examples of these activities include visits to chemical sources, locations of historical

chemistry activity, and production facilities. This presentation will discuss the how, when, and why of my experiences. It will also show the impact Mary Virginia Orna has had on my life, and the philosophy within the science education community.

Paper ID: 3645675

Caddo Nation chemistry: Art, commerce, pottery, and tools

Joe S. Jeffers, jeffers@obu.edu. Chemistry, Ouachita Baptist University, Arkadelphia, Arkansas, United States

The Caddo Nation arose from of the Mississippian culture. It was a loose confederation of native American tribes in Arkansas, Louisiana, Oklahoma, and Texas. Proto-Caddos left rock art. The Caddos produced fine pottery, artfully decorated. They tattooed their bodies. They were early practitioners of horticulture and developed fine weapons using bois d'arc (Osage orange) for bows and novaculite for arrow heads, which led to trade with other tribes. They also evaporated brine waters and were traders of salt. The focus is pre-Columbian, but European influences led them to abandon their traditional methods. This paper will present their methods, materials, and sources.

Paper ID: 3637442

John Mercer, the most colorful chemist of the 19th century

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

One of the obsessions that apply to our awardee, Mary Virginia Orna, is her love of color. When I think of the 19^{th} century, the person that intrigues me the most with regard to color is John Mercer, FRS, FCS. His personal story is inspiring; his personal knowledge of the craft of calico printing was revered throughout the civilized world; and his detailed knowledge of inorganic chemistry was unmatched in England during his lifetime. I will briefly discuss his biographical details, but I will focus on his research into both inorganic pigments and his development of the mordants needed to manufacture colored textiles. Although his birth legacy placed him low on the social scale, his best friend in England was Lord Lyon Playfair. They shared a love of chemistry and an appreciation of the value of producing the best calico prints in the world. Playfair introduced him to the Royal Society and Mercer was soon proposed for membership. He was also lionized in the Chemical Society. Chemistry elevates all those who are serious about worshipping at the altar of Vulcan.

Paper ID: 3637709

Boon or bane? Color and transparency in early silica glass

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

Silica-based glass is a very old material, with the technology of synthetic glass production thought to date back to ca. 3000 BCE. Of course, this glass technology was not discovered fully fashioned, but grew slowly through continued development of both chemical composition and techniques for its production, manipulation, and material applications. Most early glasses in the western world consisted of various soda-lime-silica compositions that depended upon the specific raw materials used. However, the composition of these glasses was usually more complex than suggested by this simple description. Besides the primary components of silica, flux, and stabilizer, these glasses also contained other minor constituents, both intentional and unintentional, that effected the subsequent properties of the glass. One such important property that was dictated by such minor constituents was the color and transparency of the resulting glass. The historical evolution of the control of color in early silica glasses will be presented, from early opaque colored glasses to the eventual successful production of colorless transparent material. In the process, the various coloring agents (both intentional and unintentional) employed during this evolution will be discussed, along with the application of decolorizing agents to remove various unwanted color contributions.

Paper ID: 3637949

"Chemical history of color," but just two kinds of them

David E. Lewis, lewisd@uwec.edu. Chemistry and Biochemistry, University of Wisconsin-Eau Claire, Eau Claire, Wisconsin, United States

In 1842, the Russian chemissr Nikolai Nikolaevich Zinin (1812-1880) reported that nitrobenzene could be reduced to aniline by heating with hydrogen sulfide and ammonia in ethanol. This simple reaction made this important compound, which had only been available by laborious methods and often impure, now available pure by the ton. This discovery was of such critical importance to the research of August Wilhelm (von) Hofmann (1818-1892) that he later wrote, "If Zinin had done nothing more than to teach the conversion of nitrobenzene into aniline, even then his name should be inscribed in golden letters in the history of chemistry." Aniline played a major role in the chemical careers of two of Hofmann's protégés: (Sir) William Hemry Perkin (1838-1907) and Peter Griess (1829-1888). As a young student in Hofmann's laboratory at the Royal College of Chemistry, in London, Perkin had prepared the first synthetic dye, mauveine, a purple dye for silk on which he built an industrial empire. Griess had come to London at Hofmann's request after Hofmann had seen his initial report on the diazotization of arylamines, discovered while in Kolbe's laboratory. In Britain, he worked at the brewery of Samuel Allsopp and Sons, in Burton upon Trent, but here he still conti ued his original research on diazotizations. This paper will focus on the history of the aniline and azo dyes.

Paper ID: 3640072

Emilio Noelting, the Mulhouse chemistry school, and the development of rational dye chemistry in the Rhine region

Arthur Greenberg, art.greenberg@unh.edu. Department of Chemistry, University of New Hampshire, Durham, New Hampshire, United States

The basis for this presentation is a student notebook dated 1894-1895: *Farbstoffe Matieres Colorantes D'Apres Lectures de M. Dr. Noelting Directeur de l'ecole de Chimie Mulhouse* (Notebook of E. Greiner).The notes include almost countless chemical structures adjacent to hundreds of mounted dyed swaths and threads corresponding to the written structures.The distinguished history of this region (including Mulhouse and Basel in the Rhine region) in the development of the dye industry is well-documented. This industrial region, from which the industrial powerhouses Sandoz and Ciba emerged, called for industrial education that came to focus on dyes and pharmaceuticals. The school of chemistry in Mulhouse was inaugurated in 1822. Its first director L. Degenne, recommended by Pierre Louis Dulong and Louis Jacques Thenard, presented the first course in 1823. However, the chemistry program was deemed too costly and Degenne was relieved in 1825. Following over one-half-century of development and increasing respect the school hired Emilio Noelting (1851-1922) as its Director. Noelting, Ph.D. ETH Zurich, introduced hard chemical science, so evident in this notebook, to complement the practical dye chemistry. He is credited with notable discoveries in the dye industry including erythrosine and rose Bengal. An interesting feature of the notebook is structures of some triarylmethane halide dyes which we now know to be triphenylmethyl ("trityl") carbocation salts. Syntheses of these water-soluble salts predated Moses Gomberg's discovery of triphenylmethyl radical in 1900 and its corresponding carbocation in 1901. Noelting's reputation was such that the precocious eighteen-year-old Alfred Werner (b. Mulhouse, 1866) submitted some research results to Noelting. Werner received the 1913 Nobel Prize in Chemistry. In 1915, Noelting's appointment as Director was terminated by the German authorities on the grounds of being a non-German citizen. The owner of the notebook may be Charles Edouard Greiner. Born 13 December 1873, he was a Paris chemist.

Paper ID: 3656474

Pattern papers of William Henry Perkin

Vera V. Mainz[1], mainz@illinois.edu, Gregory Girolami[2]. (1) School of Chemical Sciences, University of Illinois at Urbana-Champaign, Urbana, Illinois, United States (2) Chemistry, University of Illinois at Urbana-Champaign, Urbana, Illinois, United States

William Henry Perkin (1838-1907) is celebrated as the discoverer of the first synthetic aniline dye, “Aniline Purple” or “Tyrian Purple,” (also known as “mauve”). He patented the dye in England in 1856 and began manufacturing mauve and other artificial dyes at his dyeworks in

Greenford Green, near Harrow, in England. Perkin published many papers on his chemical research, and, remarkably, at least four of them in the *Journal of the Chemical Society* contained actual samples of fabric swatches or patterns dyed with artificial alizarin and its derivatives: *J. Chem. Soc.* **1870**, 23, 133-134: On Artificial Alizarin, *J. Chem. Soc.* **1873**, *26*, 425-433: On Anthrapurpurine, *J. Chem. Soc.* **1874**, *27*, 401-404: On the Action of Bromine on Alizarin, and *J. Chem. Soc.* **1876**, *30*, 578-581: On Acetyl and Nitro Derivatives of Alizarin. This paper will discuss Perkin's efforts to bring artificial alizarin to the market and his successful efforts to enlist the Chemical Society in an innovative form of advertising.

Paper ID: 3656067

Philatelic tribute to a most valuable organizer (MVO)

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

Mary Virginia Orna's long-standing involvement with the ACS Division of the History of Chemistry and the boundless energy she exhibits in her academic pursuits has been a source of inspiration to many colleagues, students, and friends. This presentation features some of my favorite contributions to symposia organized by MVO over the years, such as the "Elements Found and Lost" symposium (Fall 2014) and the "Food at the Crossroads" symposium (Spring 2018). In addition, I will use (as I typically do in my HIST presentations) postage stamps and related philatelic materials to illustrate some stories pertaining to the chemical history of color and pigments, an area in which MVO has made significant contributions.

Paper ID: 3650029

Seraph **of the Edelstein Center**

Zvi Koren, zvi@shenkar.ac.il. The Edelstein Center for the Analysis of Ancient Artifacts, Shenkar College of Engineering, Design and Art, Ramat Gan, Israel

Everyone could use a *Seraph*. Such a fiery protective and ministering angel – in spiritual or human form – is vital in guiding and helping to create a unique entity *ab initio*. This is the case of The Edelstein Center for the Analysis of Ancient Artifacts, which was established by Dr. Sidney and Mildred Edelstein in 1991 at the Shenkar College of Engineering, Design and Art in Ramat-Gan, Israel. Many members of the HIST Division of ACS are aware of Dr. Edelstein's contributions to the history of chemistry. He funded the Dexter Award, named after the Dexter Chemical Corporation, which he founded in 1945 in the Bronx, NY, and later the prize was renamed in his honor as the Sidney M. Edelstein Award. The primary aim of The Edelstein Center at Shenkar was to chemically and instrumentally analyze ancient colorants – dyes and pigments – mainly on archaeological textile dyeings excavated from Ancient Israel. Over the years, the Edelstein Center's research projects have expanded beyond the Middle East and into other related fields. It has made major discoveries in the area of historic colorants that were published and broadcast in the print and visual media. However, very few are aware of the guiding light that helped establish this Center at such a small institution near Tel Aviv. None of this research work and discoveries would have seen the light of day without the *Seraph* who was instrumental as an active catalyst in the birth of this Center. This talk will highlight the activation energy involved with the establishment of The Edelstein Center and will present certain colorful discoveries that it has made. Additionally, the color of any *Seraph* will be disclosed based on an etymological analysis, and, finally, the identity of The Edelstein Center's *Seraph* will be revealed to the world.

Paper ID: 3641480

Mvo and chemsource

Patricia Smith, pjvsmith@aol.com. Chemistry, Central College, Pella, Iowa, United States

In 1989 in Berekely, CA, a group of chemists met to discuss how to best support high school chemistry teachers. The result involved chemists, chemistry professors, and high school chemistry teachers across the country in the creation of volumes of curricular resources. Mary Virginia Orna became the principal investigator for this huge and unwieldy project. She continues to support and update this valuable resource still in use in high school laboratories and classrooms. The contents of each of the more than forty units range from Laboratory Activities to Pictures in the Mind to History: on the Human Side.

Paper ID: 3637856

Truly, and necessarily, on the shoulders of giants: An astonishing historic journey

Mary Virginia Orna, maryvirginiaorna@gmail.com. Chemistry, College of New Rochelle, New Rochelle, New York, United States

Having one's birthday on the Fourth of July necessitates going to a parade at least once a year. Unfortunately, not everyone loves a parade, especially if one is small, little, petite, dumpy, tiny, squat, diminutive, undersized or stunted (choose your adjective). Anyone answering to one of these not-so-desirable descriptives gets to see only the backs of tall men unless one of them swings you up to his shoulders and lets you perch. My great good fortune is that more than one tall man (and a few tall women), both literally and figuratively, augmented my stature so that I could, indeed, like Isaac Newton, see farther, more clearly, and with unobstructed view. This paper will document my experiences from the crow's nest provided by so many of my valued colleagues.