THE ONE HUNDRED AND SEVENTH PRESENTATION OF THE WILLARD GIBBS MEDAL (FOUNDED BY WILLIAM A. CONVERSE)
TO PROFESSOR CYNTHIA J. BURROWS
sponsored by the CHICAGO SECTION of the AMERICAN CHEMICAL SOCIETY
FRIDAY, MAY 11, 2018

Meridian Banquets
1701 Algonquin Road
Rolling Meadows, IL 60008
847-952-8181

ON-SITE PARKING: Free

RECEPTION WITH HORS D’ŒUVRES
6:00 - 7:00 P.M.
(with two complimentary drinks)

DINNER
7:00 - 8:30 P.M.

ACS AWARD CEREMONY
8:30 - 8:45 P.M.

• A History of the Willard Gibbs Award by Anthony Toussaint, Chicago Section Chair
• Introduction of Professor Burrows by Chuan He, University of Chicago
• Presentation of the Gibbs Medal by Peter Dorhout, President of the American Chemical Society

GIBBS AWARD LECTURE BY PROFESSOR BURROWS
8:45 – 9:45 P.M.

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“Beyond Watson & Crick: Roles for Alternative Bases and Folds in the Genome”

(continued on page 2)
The Citation – For groundbreaking work in the chemistry of DNA damage, particularly chemical modifications related to oxidative stress occurring on guanine, one of the bases of DNA and RNA.

- Identified hyperoxidized structures in DNA and elucidated their effects on DNA structure and biochemistry.
- Investigated the chemical structures and mechanisms by which DNA and RNA bases, notably guanine, undergo transformations under conditions of oxidative stress.
- Synthesized and characterized site-specifically modified DNA and RNA strands, allowing the study of proteins that interact with modified bases such as those involved in replication, transcription and repair.
- Identified hyperoxidized hydantoin lesions in DNA that are highly mutagenic and appear to play significant roles in signaling for DNA repair.

MENU

Soup: Cream of Tomato Basil Bisque with Bleu Cheese

Meridian Salad
Choice of Entree:
- BEEF: Roast Top Sirloin with Rosemary Merlot Sauce
- SALMON: Fresh Broiled Norwegian Salmon with Dill Sauce
- VEGETARIAN: Portobello Mushroom with Zucchini

Dessert: Hot Fudge Brownie a la mode

Tickets: $50 for members, $52 for non-members

RESERVATIONS:

Dinner Registration Deadline: 12:00 noon on Monday, May 7
Lecture-only Registration Deadline: 12:00 noon Wednesday, May 9

Dinner reservations are required and should be received in the Section Office via phone (847-391-9091), email (chicagoacs@ameritech.net) or website (http://chicagoacs.org/meetinginfo.php?id=130&ts=1521136587). PLEASE HONOR YOUR RESERVATIONS. The Section must pay for all dinner orders. No-shows will be billed.

ABSTRACT

Less than 2% of the human genome codes for the amino acid sequence of proteins. Why is all the rest of the DNA there? Some of it participates in orchestrating replication, some in the protection of the ends (telomeres), and some sequences upstream of a gene (promoters) control whether or not a gene is expressed as protein. All of these functions of DNA include guanine-rich sequences capable of folding into G-quadruplexes, four-stranded folds of DNA that differ dramatically from the classical base-pairing scheme of the Watson-Crick double helix. Furthermore, the G-rich sequences are sensitive to oxidative stress, converting to modified structures including 8-oxo-7,8-dihydroguanine (OG) and hyperoxidized lesions (Sp). Both the overall reactivity of a G residue in DNA or RNA and the final oxidized G product formed are highly dependent on sequence, solvent exposure and mechanism. For example, oxidation of G in G-quadruplex folds leads to very different outcomes compared to those in Watson-Crick B-helical duplexes. The location of G damage in turn has a profound effect on the stability of duplex vs. quadruplex structures. We propose that G-rich sequences respond to oxidative stress by selecting a secondary structure that can best accommodate the damaged base, and that ‘shape-shifting’ may be used as a signaling mechanism to affect transcription and repair. The implications are that nucleotide identity beyond the exome may be important in gene expression and disease, and that the definition of epigenetic modifications should be expanded to include guanine oxidation.

The mission of the Chicago Section of the ACS is to advance the chemical sciences and their practitioners for the benefit of Earth and its people

BIOGRAPHY

Dr. Cynthia J. Burrows is the Thatcher Distinguished Professor of Chemistry at the University of Utah and presently Chair of the Department of Chemistry. She was raised in St. Paul, Minnesota and Boulder, Colorado. Her early training was in physical organic chemistry with Prof. Stan Cristol at the University of Colorado (B.A. 1975) and Prof. Barry Carpenter at Cornell University (Ph.D., 1982), followed by a NSF-CNRS post-doctoral fellowship in the laboratory of Prof. Jean-Marie Lehn, Université Louis Pasteur, Strasbourg (1981-83). From 1983-1995, she was on the faculty at the Stony Brook University, before returning west to take a position at the University of Utah in Salt Lake City in 1995.

The Burrows research group investigates the chemistry and biochemistry of modified bases in DNA and RNA with a focus on oxidative stress, an underlying component of age-related diseases such as cancer. The approach is multidisciplinary involving the organic chemistry of base modification in DNA, the enzymology of polymerase bypass and DNA repair, biophysical studies of the effects of base modification, single-molecule studies of DNA and RNA in nanopores, whole-genome sequencing and cellular studies of synthetically modified oligomers.

Prof. Burrows served as Senior Editor of the Journal of Organic Chemistry for many years and since January 2014 is Editor-in-Chief of Accounts of Chemical Research. She is a past recipient of the Robert Parry Teaching Award and the University Distinguished Teaching Award; her research was recognized with the ACS Utah Award, ACS Cope Scholar Award, and the University of Utah’s distinguished Creative and Scholarly Research Award; she is also the 2018 recipient of the James Flack Norris Award in Physical Organic Chemistry. She was inducted into the American Academy of Arts and Sciences in 2009 and elected to the National Academy of Sciences in 2014.
WILLARD GIBBS AWARD

The Willard Gibbs Award, has been presented by the Chicago Section of the American Chemical Society since 1910. It was founded by William A. Converse (1862-1940), a former Chairman and Secretary of the Chicago Section and named for Professor Josiah Willard Gibbs (1839-1903) of Yale University. Gibbs, whose work with Maxwell and Boltzmann developed the field of Statistical Mechanics and is known to millions of undergraduates for Gibbs Free Energy (developed in 1933), as he solved the question of the maximum amount of work that can be done by a system on the universe during a change in state of the system (ΔGsys=-TΔS sys) and ultimately the more familiar ΔG=ΔH-TΔS.

The purpose of the award is “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.” Gibbs was chosen to be the model for the award as an outstanding example of creativity in scientific investigation. Medalists are selected by a national jury of twelve eminent chemists from different disciplines elected by the Chicago Section ACS Board. The nominee must be a chemist who, because of the preeminence of their work in and contribution to pure or applied chemistry, is deemed worthy of special recognition.

Mr. Converse supported the award personally for a number of years, and then established a fund for it in 1934 that had subsequently been supported by the Dearborn Division of W.R. Grace & Co. Considerable contributions to the award have also been made by J. Fred Wilkes and his wife. The award consists of an eighteen-carat gold medal having, on one side, the bust of J. Willard Gibbs, for whom the medal was named. On the reverse is a laurel wreath and an inscription containing the recipient's name. Most of the awardees that you see below are familiar to chemists regardless of specialty. This fame may result from later recognition, including, in many cases, the Nobel Prize, or the reason may be that textbooks have permanently associated many of these names with classic reactions or theories.

PAUL BRANDT

1911 Svante Arrhenius
1912 Theodore William Richards
1913 Leo H. Baekeland
1914 Ira Remsen
1915 Arthur Amos Noyes
1916 Willis R. Whitney
1917 Edward W. Morley
1918 William M. Burton
1919 William A. Noyes
1920 F. G. Cottrell
1921 Mme. Marie Curie
1922 no award
1923 Julius Stieglitz
1924 Gilbert N. Lewis
1925 Moses Gomberg
1926 Sir James Colquhoun Irvine
1927 John Jacob Abel
1928 William Draper Harkins
1929 Claude Gilbert Hudson
1930 Irving Langmuir
1931 Phoebus A. Levene
1932 Edward Curtis Franklin
1933 Richard Willstätter
1934 Harold Clayton Urey
1935 Charles August Kraus
1936 Roger Adams
1937 Herbert Newby McCoy
1938 Robert R. Williams
1939 Donald Dexter Van Slyke
1940 Vladimir Ipatieff
1941 Edward A. Doisy
1942 Thomas Midgley, Jr.
1943 Conrad A. Elvehjem
1944 George O. Curme, Jr.
1945 Frank C. Whitmore
1946 Linus Pauling
1947 Wendell M. Stanley
1948 Carl F. Cori
1949 Peter J. W. Debye
1950 Carl S. Marvel
1951 William Francis Giauque
1952 William C. Rose
1953 Joel H. Hildebrand
1954 Elmer K. Bolton
1955 Farrington Daniels
1956 Vincent du Vigneaud
1957 W. Albert Noyes, Jr.
1958 Willard F. Libby
1959 Hermann I. Schlesinger
1960 George B. Kistiakowsky
1961 Louis Plack Hammett
1962 Lars Onsager
1963 Paul D. Bartlett
1964 Izaak M. Kolthoff
1965 Robert S. Mulliken
1966 Glenn T. Seaborg
1967 Robert Burns Woodward
1968 Henry Eyring
1969 Gerhard Herzberg
1970 Frank H. Westheimer
1971 Henry Taube
1972 John T. Edsall
1973 Paul John Flory
1974 Har Gobind Khorana
1975 Herman F. Mark
1976 Kenneth S. Pitzer
1977 Melvin Calvin
1978 W. O. Baker
1979 E. Bright Wilson
1980 Frank Albert Cotton
1981 Bert Lester Vallee
1982 Gilbert Stork
1983 John D. Roberts
1984 Elias J. Corey
1985 Donald J. Cram
1986 Jack Halpern
1987 Allen J. Bard
1988 Rudolph A. Marcus
1989 Richard B. Bernstein
1990 Richard N. Zare
1991 Günther Wilke
1992 Harry B. Gray
1993 Peter B. Dervan
1994 M. Frederick Hawthorne
1995 Sir John Meurig Thomas
1996 Fred Basolo
1997 Carl Djerassi
1998 Mario J. Molina
1999 Lawrence F. Dahl
2000 Nicholas Turro
2001 Tobin J. Marks
2002 Ralph Hirschmann
2003 John I. Brauman
2004 Ronald Breslow
2005 David A. Evans
2006 Jacqueline K. Barton
2007 Sylvia T. Ceyer
2008 Carolyn R. Bertozzi
2009 Louis Brus
2010 Maurice Brookhart
2011 Robert G. Bergman
2012 Mark A. Ratner
2013 Charles M. Lieber
2014 John E. Bercaw
2015 John F. Hartwig
2016 Laura Kiessling
2017 Judith Klinman

Materials:
Plastic drinking bottle (1 or 2 L) with lid
Water
Ketchup or soy sauce packet or pen cap with modelling (or Sculpey) clay

Experiment:
Fill with water nearly to the top of the bottle. Add the ketchup packet (or if using the pen cap, add about a pea size piece of clay to the arm of the cap and put it in clay-side down – there should not be so much clay on it that the cap sinks in water – might want to see if it floats first in a glass of water – you want it to barely float). Put the cap on the bottle tightly and squeeze the bottle. You should see the packet (or cap) sink to the bottom. As you release the bottle the packet or cap should rise again. You can repeat this over and over.

What’s happening?
René Descartes (1596 – 1650) is thought to have invented this toy. Descartes is considered the father of Cartesian or analytic geometry used in the discovery of calculus and his name is the basis of the Cartesian coordinate system. The object floats on water because there is trapped air inside the packet or pen cap making the entire unit less dense than water. However, as you squeeze the bottle you are compressing that air causing it to take up less space. If an object has a mass and takes up a certain amount of space and then you make it take up less space, you will increase its density. In this case you change its density so much that it becomes “heavier” than the water and it sinks. When you stop squeezing the bottle, the air in the object expands again and the object becomes less dense and again floats to the top.

References:
https://sciencebob.com/make-a-cartesian-diver/
https://www.education.com/activity/article/soy-sauce-science/

To view all past “ChemShorts for Kids,” go to:
http://chicagoacs.org/ChemShorts

Paul Brandt
REPORT OF COUNCIL MEETING HELD IN THE SPRING OF 2018

The 255th National Meeting of the ACS was held in New Orleans, LA, from March 18 – 22, 2018. The theme of this meeting was “Nexus of Food, Energy & Water.” The Chicago section was represented at Council by our complete contingent of councilors: Charles Cannon (Local Section Activities), David Crumrine (Constitution and Bylaws), Ken Fivizzani (Community Activities), Russell Johnson (Chemistry and Public Affairs), Michael Kohler (Chemical Safety), Fran Kravitz (Ethics), Margy Levenberg (Meetings and Expositions), Mit Levenberg (Senior Chemists), Inessa Miller and Barbara Moriarty (Chemistry and Public Affairs). The national activities of each are given, as I know them. In addition, Marsha Anne Phillips, who was a councilor from Chicago, was recognized as a deceased councilor.

Finances: The Committee on Budget and Finance reported that the Society ended 2017 with $553.1 million in total revenue, which was $26.4 million more than in 2016. The total expenses ended the year at 524.5.0 million, which was $21.6 million higher than the previous year. The unrestricted net assets for the society increased enough so that the ACS is in compliance with all five of the Board-established financial guidelines.

Governance: The Council elected Luis A. Echegoyen and Thomas R. Gilbert to be candidates for President-Elect of the society. The election, along with any petition candidates, will be held in the fall of 2018.

Meetings and Expositions: As of March 19, 2018, the 255th ACS national meeting had attracted 16,585 registrants, including 8470 regular attendees and 6432 student attendees. In addition, it was reported that there were 13,213 scientific contributions at this meeting.

Membership Affairs: At the end of 2017, membership was 150,900, which is less than on the same date in 2016. The loss of regular members has declined for 11 continuous years. However, other membership categories have remained the same. After a vigorous debate, the cost of membership was increased at the fully escalated rate to $175 for 2019.

Committee on Economic and Professional Affairs: The career fair at the meeting had 422 job seekers, 15 employers and 26 jobs posted. The US membership unemployment was 2.9%.

Petitions: The Council voted to approve the “petition on the Composition of Society Committees.” The Council voted against the “petition for Election of Committee Chairs.”

Divisions: An allocation to divisions recognizing programming at regional and international meetings was recommitted.

Education: On 3/16/2018 membership in American Association of Chemistry Teachers (AACT) reached 5000.

If you have any questions and/or comments about the above actions, please contact me or one of your other councilors. You may contact me by email at barbaramoriarty0@gmail.com.

BARBARA MORIARTY

DID YOU KNOW?
The Chemical Bulletin, while officially published by the Chicago Section ACS for Chicago-area chemists, was a joint publication with the Ames, Illinois, Iowa, Louisville, Milwaukee, Minnesota, Montana, Northeast Wisconsin, Nebraska, Purdue, Sioux Valley, Peoria, St. Joseph Valley, Kalamazoo, Quincy-Keokuk, St. Louis and Wisconsin Sections from the time it was founded until the 1970s. It reported news submitted from these sections as well as of the Chicago section.

WHEN YOU CHANGE YOUR EMAIL ADDRESS
Please let the section office know what your new email address is so that you will not miss any notes concerning issues of The Chemical Bulletin or other section information. Contact the office at 847-391-9091 or at chicagoacs@ameritech.net.

RUBBER STAMPS-3
The third stamp in this series is a piece trying to engage the reader in art. Apparently the National Meetings used to have art exhibits that showcased the many talents of their ACS colleagues. The Art and Photo Shows were two different exhibits put out while the Exposition was going on and the judging awarded prizes in Classical and Modern fields in the Art Show and numerous prizes were given in the Photo show. There was even a 17-minute color film of crystal growth as seen through a polarizing microscope! The rubber stamps were provided by James A. Wuellner of Standard Oil Co. He was the artist and Assistant Editor of the Chemical Bulletin in January of 1955. This third sketch was published in September 1958. All of the sketch's in this series can be seen in their original format by using the Northwestern University Library Online http://books.northwestern.edu/viewer.html?id=unu:unu-mntb-0005391474-bk and there are 16,937 images starting with the 1919 Chemical Bulletin. The third stamp comes from the image #16,100 and was advertising for the 134th National Meeting held in Chicago.

Paul Brandt
May 11: Chicago ACS Willard Gibbs Award Banquet. Dr. Cynthia J. Burrows, University of Utah, is the recipient of the 2018 Willard Gibbs Medal at Meridian Banquets in Rolling Meadows.


May 19: Chicago Section Scholarship Exam at North Central College


June 18: You Be The Chemist National Challenge

August 9-19: The Illinois State Fair in Springfield. Come volunteer at the ACS booth. [https://www2.illinois.gov/state-fair/Pages/default.aspx](https://www2.illinois.gov/state-fair/Pages/default.aspx)

August 19-23: 256th American Chemical Society National Meeting and Exposition “Nanoscience, Nanotechnology & Beyond” Boston, MA. [https://www.acs.org/content/acs/en/meetings/national-meeting.html?sc=home_meetings_180116_mtg_BO18_od](https://www.acs.org/content/acs/en/meetings/national-meeting.html?sc=home_meetings_180116_mtg_BO18_od)

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