

Citation for Chemical Breakthrough Award Program Update (Including 2016 Award Year)

Jeffrey I. Seeman
Award Committee Secretary

August 14, 2017

Summary

- Eleven years of awards (2006 –2016) have been completed including four awards for the 2016 award year
- 57 CCB Awards presented to date at 65 sites (due to multiple collaborations and locations)
- Status for the 2017 award year: The awards committee has provided its complete ballots and the four awardees have been determined. The plan is to announce to HIST's EC the recipients for 2017 prior to the upcoming Fall ACS National Meeting.
- CCB Awards are plaques only, given to institution from which the research was published
- We provide assistance with and sometimes participation in award ceremonies
- Five award ceremonies were held in the last 12 months
 - Universität Innsbruck, Austria: Flaundler (G. Restrepo represented HIST)
 - Manchester University: Frankland (Robert Anderson represented HIST)
 - Oxford University: Crowfoot (Peter Morris represented HIST)
 - Rice University: Kroto (Held at Fall ACS National Meeting)
 - Académie des sciences, Paris Mark Casida represented HIST)
- Photographs and associated text dealing with the award ceremonies are found on the CCB Award's web pages
- The CCB Award program now has many and an increasing number of links on Wikipedia
- The CCB Award program now has a link and a large description of the program on the ACS National Historic Chemical Landmarks Program

The 2016 awards are listed in the graph below, taken from the CCB Award web site that is housed on the HIST website that is designed and maintained by Vera Mainz.

From the HIST website:

Citations for Chemical Breakthrough Awards

2016 Awardees

NOTE: Text in **COLOR** indicates a "live" link.

Scientists/Inventors	Breakthrough Publication (If text is in color, this is a live link to the plaque.)	Location of Award (If text is in color, this is a live link to photographs and other materials related to the presentation.)
L. Pfaundler	"Beitrag zur Chemischen Statik," (<i>Poggendorff Annalen der Physik und Chemie</i> , 1867 , 131, 55-85.	Universität Innsbruck, Austria
E. C. Anderson, W. F. Libby, S. Weinhouse, A. F. Reid, A. D. Kirshenbaum, and A. Grosse	"Radiocarbon from Cosmic Radiation," <i>Science</i> 1947 , 105, 576-577.	The University of Chicago
H. Gutowsky, D. W. McCall, and C. P. Slichter	"Coupling among Nuclear Magnetic Dipoles in Molecules," <i>Physical Review</i> , 1951 , 84, 589-590.	University of Illinois at Urbana-Champaign
F. Sanger, S. Nicklen, and A. R. Coulson	"DNA Sequencing with Chain-Terminating Inhibitors," <i>Proceedings of the National Academy of Science</i> , 1977 , 74, 5463-5467.	Medical Research Council Laboratory of Molecular Biology, Cambridge

The 2016 award plaques are shown at the very end of this report. All plaques are also found on the HIST website under HIST Awards, Citation for Chemical Breakthrough Award.

The members of the 2016 Award Committee are listed below and also on the HIST website (with the Award Committee members from the first award year).

Award Committee Members

2016

Anthony G. M. Barrett, F.R.S. (Imperial College of Science, Technology and Medicine)

Michael Bowers (University of California, Santa Barbara)

Carmen Giunta (Le Moyne College)

Harry Gray (Caltech)

Dudley Herschbach (Harvard)

Peter Morris (Science Museum London)

Amos Smith (Penn)

Joanne Stubbe (MIT)

Jeffrey I. Seeman, Committee Secretary (Non-voting)(University of Richmond)

- The program has received excellent responses in the USA and Europe. To date, no awards have been presented to Asia or South America.
- Announcements of the call for nominations and of the awardees appear regularly in C&EN.
- The plaque-design process is much more difficult than anticipated. It is often hard to obtain the required high quality scans of original publications from the 19th Century. There have been design issues with the recipient organizations.
- We have received extraordinary cooperation from the plaque manufacturer, Stellar Kent (<http://www.stellarkent.com/index.php>). In fact, in 2014, HIST Certificate of Appreciation Awards were given to Carol Hall, Linda Mason, and the Stellar Kent Corporation for their work on the CCB award program.
- As of 2014, the Linda Hall Library of Science, Engineering and Technology (Kansas City, MO) has donated several high quality images of journal articles, if available, at no charge for the award program

Finances and Donations

- The plaques cost ca. \$350 each including shipping to the USA. Shipping to Europe is another \$75 - \$100 and sometimes considerably more than \$100 depending on location.
- Initial funding
 - \$10K from ACS DAC Innovative Grant
 - \$10K from ACS Corporate Associates
 - \$6K from ACS DAC Innovative Grant for Local Section travel
 - Funds from individual donors (which continues to this day)
- HIST currently provides 50% matching to one annual donation (individual donor, \$1200/year; HIST, \$600/year).
- Annual costs ca. \$1700 - \$2200/year.
- Annual income ca. \$1800/year.
- As of August 15, 2017, there is \$2049.61 available for the plaque program (excluding travel, see bullet statement immediately below).
- Based on the latest update available for HIST Treasurer Vera Mainz, there is \$4173.16 available for travel support for local section and related representation (ACS Innovative Grant Program).

Website

The HIST website contains high quality images of all the plaques and much supplementary information, including photographs of many awards ceremonies, ceremony agenda, and related materials.

The CCB award program's website is exceptional and expanding, thanks to the continuing excellent work of Vera Mainz. The website is organized by award year. Originally, there was only a table of all award winners for each year (from 2006 when the first awards were presented). From that page, one could and can see the award plaques for each winner as well as the supplementary material associated with that award. In 2014, several new pages were added that provide the visitor with rapid access to the awardees, organized by name OR location OR date of the awardee's publication.

We are fortunate that most of the recipients have provided photographs and other information about their presentation ceremonies, etc. for use on our website.

CCB Award on Wikipedia

In early August 2016, Ron Brashier introduced us to Mary Mark Ockerbloom, Wikipedian in Residence at the Chemical Heritage Foundation. She has volunteered, as part of her outreach role at CHF, to place information about the CCB awards on Wikipedia. She has now placed text on Wikipedia to the CCB award and links on Wikipedia to HIST's website for all the awards presented in 2015 and 2016. For many of these awards, text and links are found in multiple locations due to multiple authors who already have Wikipedia sites. We plan on completing links and text for all CCB awards in early 2018.

CCB Award on the ACS Historic National Historic Chemical Landmarks Program Website

On the "About the ACS Historic National Historic Chemical Landmarks Program" web page, <https://www.acs.org/content/acs/en/education/whatischemistry/landmarks/about.html> the following text and link appears:

Citation for Chemical Breakthrough Awards

Since 2006, the Citation for Chemical Breakthrough Award program, administered by the ACS Division of the History of Chemistry, has honored scientific publications, books and patents that have been revolutionary in concept, broad in scope, and which forever changed the face of chemistry.

In 2016, four awards were made:

- L. Pfaundler on the kinetic theory of chemical reactions (1867), to the University of Innsbruck
- E. C. Anderson, W. F. Libby, S. Weinhouse, A. F. Reid, A. D. Kirshenbaum and A. V. Grosse, for radiocarbon dating to estimate the age of organic materials (1947), to the University of Chicago
- H. Gutowsky, D. W. McCall and C. P. Slichter, for the first observation of spin-spin couplings in liquids, a crucial step in transforming NMR spectroscopy into one of the most powerful tools in chemical science (1951), to the University of Illinois
- F. Sanger, S. Nicklen and A. R. Coulson, for DNA sequencing with chain-terminating inhibitors (1977), to the Medical Research Council Laboratory of Molecular Biology, Cambridge, England

The four 2016 award plaques are shown on the next four pages.



Division of the History of Chemistry
American Chemical Society



Citation for Chemical Breakthrough

First observation of spin-spin couplings in liquids,
a crucial step in transforming NMR spectroscopy
into one of the most powerful tools in chemical science.

Physical Review 1951, 84, 589-590.

Coupling among Nuclear Magnetic Dipoles in Molecules*

H. S. GUTOWSKY, D. W. MCCALL, AND C. P. SLICHTER
University of Illinois, Urbana, Illinois
(Received September 10, 1951)

MULTIPLE nuclear magnetic resonance lines have been reported in several liquids, such as the Sb resonances¹ in aqueous NaSbF₆, and the P³¹ and F¹⁹ resonances² in POCl₂F, POClF₂, and CH₂OPF₂. Suggested interpretations of these effects include hindrance to molecular rotation¹⁻³ and second-order magnetic dipolar interactions.⁴ We feel that new measurements of ours, together with the previously published results,² exclude both of the above suggestions, in general, and we would like to propose the hypothesis that the splittings come from a second-order interaction between the nuclear magnetic moments and some magnetic field internal to the molecule.

The interaction that we propose is of the form $A \mathbf{u}_1 \cdot \mathbf{u}_2$, where A is a constant independent of temperature and H_0 . Such a form can actually be obtained from arguments of rotational invariance alone, and thus would result from any form of coupling through molecular magnetic fields.

Presented to the University of Illinois, 2016.



Division of the History of Chemistry
American Chemical Society



Citation for Chemical Breakthrough

Radiocarbon dating to estimate the age of organic materials.

Science, 1947, 105, 576-577.

Radiocarbon From Cosmic Radiation¹

E. C. ANDERSON and W. F. LIBBY

*Institute for Nuclear Studies and
Department of Chemistry, University of Chicago*

S. WEINHOUSE, A. F. REID,

A. D. KIRSCHENBAUM, and A. V. GROSSE

*Houdry Process Corporation,
Marcus Hook, Pennsylvania*

Measurements on the enriched biomethane samples established the activity of "living" carbon to be 10.5 disintegrations/minute/gram, in good agreement with the predicted value. On the other hand, enrichment of the petromethane by a factor of 25 failed to show activity beyond the limits of experimental error, in line with the theory that cosmic rays produce our activity.

TABLE 1

Source	Sample No.	Calculated C^{14} enrichment	C^{14} concentration from mass spectrometer (%)	% CH_4 in gas before final purification	Date taken	Total count rate, including background (disintegrations/minute)
Petro-methane	I	1	1.04	99.6	10/16/46	340.6 \pm 1.0
	II	1	1.04	99.6	"	342.6 \pm 1.0
	III	25	6.55	97.2	1/ 6/47	345.8 \pm 1.3
	III	1	1.04	99.4	12/ 5/46	342.9 \pm 2.0
Bio-methane	I	10	7.36	93.6	10/17/46	348.7 \pm 1.3
	VII	32	11.02	99.9	12/ 2/46	364.0 \pm 1.5
	VIII	260	63.5	97.2	2/10/47	562.0 \pm 2.9

Presented to the University of Chicago, 2016.



Division of the History of Chemistry
American Chemical Society



Citation for Chemical Breakthrough

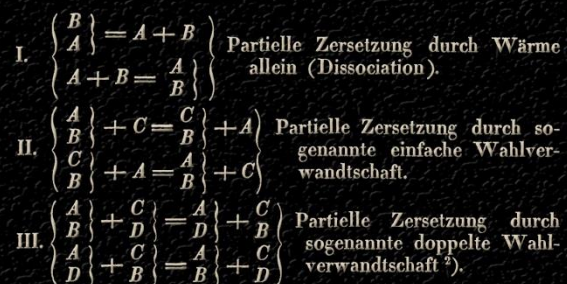
On the Kinetic Theory of Chemical Reactions

Annalen der Physik und Chemie, 1867, 131, 55-85.

III. Beiträge zur chemischen Statik; von Dr. Leopold Pfaundler.

Die Theorie, welche ich in dieser Abhandlung entwickeln will, scheint mir geeignet, eine Erklärung für einige chemische Thatsachen zu liefern, für welche bisher keine genügende Hypothese aufgefunden werden konnte.

Zu diesen Thatsachen gehören die Erscheinungen der *Dissociation*, der sogen. *Massenwirkung*, der *reciproken* und der *prädisponirenden Affinität*, der *Gleichgewichtszustände zwischen entgegengesetzten Reactionen* und einige andere verwandte Erscheinungen.



Presented to the University of Innsbruck, 2016.

NHCL Program Information and Resources

- Take action: Nominate a Landmark
 - [Landmark designation planning information](#)
 - Special procedures for international and local section designations
 - Answers to frequently asked questions
 - Landmarks program contacts
-

Citation for Chemical Breakthrough Awards

Since 2006, the Citation for Chemical Breakthrough Award program, administered by the ACS Division of the History of Chemistry, has honored scientific publications, books and patents that have been revolutionary in concept, broad in scope, and which forever changed the face of chemistry.

In 2016, four awards were made:

- L. Pfaundler on the kinetic theory of chemical reactions (1867), to the University of Innsbruck
- E. C. Anderson, W. F. Libby, S. Weinhouse, A. F. Reid, A. D. Kirshenbaum and A. V. Grosse, for radiocarbon dating to estimate the age of organic materials (1947), to the University of Chicago
- H. Gutowsky, D. W. McCall and C. P. Slichter, for the first observation of spin-spin couplings in liquids, a crucial step in transforming NMR spectroscopy into one of the most powerful tools in chemical science (1951), to the University of Illinois
- F. Sanger, S. Nicklen and A. R. Coulson, for DNA sequencing with chain-terminating inhibitors (1977), to the Medical Research Council Laboratory of Molecular Biology, Cambridge, England

More information is available on the [HIST Citation Awards](#) webpage.