



The Division of the History of Chemistry of the American Chemical Society

米国化学会 化学史部門

Citation for Chemical Breakthrough Awards

歴史的化学論文大賞

Presented by Professor Yoshiteru Maneo, Kyoto University, Representing the Division of History of Chemistry of the American Chemical Society, Nagoya University, July 2, 2022.

Citation for Chemical Breakthrough Awards

歴史的 化学論文 大賞

18世紀の後半から今日に至る自然科学研究における膨大な数の論文の中から、人類の発展に著しく貢献した歴史的な化学論文を選定し、その研究が行われた研究機関を顕彰する。

米国化学会の化学史部門（ACS-HIST）が、2006年以降、これまでに真に画期的な約80の論文を選出。

“化学の殿堂” “Chemistry Hall of Fame”

アジアの研究機関が受賞対象となるのは今回が初めて。

2021 Awardees

歴史的化学論文大賞 2021年度 受賞者

J. Willard Gibbs

"On the Equilibrium of Heterogeneous Substances,"
Transactions of the Connecticut Academy of Arts and Sciences **1876**, 3,
108 - 248; **1878**,3, 343 - 524.

Yale University

K. Fukui, T. Yonezawa, and H. Shingu

"A Molecular Orbital Theory of Reactivity in Aromatic Hydrocarbons,"
The Journal of Chemical Physics **1952**, 20, 722 -725.

Kyoto University

R. Noyori, T. Ohkuma, M. Kitamura, H. Takaya, N. Sayo,
H. Kumobayashi, and S. Akutagawa

"Asymmetric Hydrogenation of β -Keto Carboxylic Esters. A Practical,
Purely Chemical Access to β -Hydroxy Esters in High Enantiomeric Purity,"
J. Am. Chem. Soc. **1987**, 109(10), 5856 - 5858.

Nagoya University, Institute for Molecular Science, Japan Takasago
International Corporation

Citation for Chemical Breakthrough Awards --- Criteria

歴史的化学論文大賞の選考基準

■ Awards are made for breakthrough publications, patents, and books

革命的

➤ **Revolutionary** - a change in practice or theory

広い視野

➤ **Broad in scope** - advances that permeate a sub-discipline of chemistry, or that has applications in more than one sub-discipline, or that has a significant benefit to society

長期に渡る
影響力

➤ **Long term in impact** - a minimum of 25 years since the date of publication

出版から25年以上経過していること

Citation for Chemical Breakthrough Award Program

Nominations

歴史的化学論文大賞の推薦方法

- Anyone can make a nomination
- Nomination requirements
 - A full literature citation
 - A justification of no more than 200 words

推薦理由は200語以内で

Awards Committee

選考委員

- Anthony Barrett, FRS (Imperial College London)
- Michael Bowers (University of California, Santa Barbara)
- Carmen Giunta (Le Moyne College)
- Harry Gray (Caltech)
- Catherine Jackson (Oxford)
- Peter Morris (Science Museum, London)
- Mary Virginia Orna (College of New Rochelle)
- Amos Smith (University of Pennsylvania)
- **Jeffrey Seeman**, Non-voting secretary
(University of Richmond) 米国ヴァージニア州

ジェフ・シーマン



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- Volunteer work by many
- And support from institutions like yours!

Some Previous Awardees

これまでの受賞者の例

M. Gomberg, An Instance of Trivalent Carbon: Triphenylmethyl [Free radicals], *J. Am. Chem. Soc.* **1900**, 22, 757-771. (University of Michigan)

A. Werner, Neuere Anschauungen auf dem Gebiete der Anorganischen Chemie, Vieweg, Braunschweig, **1905** (Zurich) 元素の長周期表の考案者でもある

G N Lewis, The Atom and the Molecule, *J. Am. Chem. Soc.* **1916**, 38, 762-785. (University of California, Berkeley)

L. Pauling, The Nature of the Chemical Bond, Cornell University Press, **1939**. (Caltech)

Watson, J. D.; Crick, F. H. Molecular structure of nucleic Acids. A structure for deoxyribose nucleic acid [Double helical structure of DNA], *Nature* **1953**, 171, 737-738 (Medical Research Council, Cambridge)

M. J. Molina and F. S. Rowland, Stratospheric Sink for Chlorofluoromethanes: Chlorine Atom-Catalysed Destruction of Ozone, *Nature* **1974**, 249, 810-812. (University of California, Irvine)



Division of the History of Chemistry
American Chemical Society

Citation for Chemical Breakthrough



Discovery of the Periodic Table of Chemical Elements

D. Mendeleeff, *Zeitschrift für Chemie*,
1869, 12, 405 – 406.

Ueber die Beziehungen der Eigenschaften zu den Atomgewichten der Elemente. Von D. Mendeleeff. — Ordnet man Elemente nach zunehmenden Atomgewichten in vertikale Reihen so, dass die Horizontalreihen analoge Elemente enthalten, wieder nach zunehmendem Atomgewicht geordnet, so erhält man folgende Zusammenstellung, aus der sich einige allgemeine Folgerungen ableiten lassen.

			Tl = 50	Zr = 90	? = 180
			V = 51	Nb = 94	Ta = 182
			Cr = 52	Mo = 96	W = 186
			Mn = 55	Rh = 104,4	Pt = 197,4
			Fe = 56	Ru = 104,4	Ir = 198
			Ni = 59	Pd = 106,0	Os = 199
			Cu = 63,4	Ag = 107,2	Hg = 200
II — 1			Zn = 65,2	Cd = 112	
	Be = 9,4	Mg = 24	? = 68	Hr = 116	Au = 197 ?
	B = 11	Al = 27,4	? = 70	Su = 118	
	C = 12	Si = 28	As = 75	Sb = 122	Bi = 210 ?
	N = 14	P = 31	Se = 78,4	Te = 128 ?	
	O = 16	S = 32	Br = 80	I = 127	
	F = 19	Cl = 35,5	Rb = 85,4	Cs = 133	Tl = 204
Li = 7	Na = 23	K = 39	Ca = 40	Sr = 87,6	Ba = 137
			? = 45	Ce = 92	Pb = 207
			Th = 50	La = 94	
			Yt = 60	Di = 96	
			U = 75,6	Th = 119 ?	

- Die nach der Größe des Atomgewichts geordneten Elemente zeigen eine stufenweise Abänderung in den Eigenschaften.
- Chemisch-analoge Elemente haben entweder übereinstimmende Atomgewichte (Pt, Ir, Os, oder letztere nähmen gleichviel zu (K, Rb, Cs).
- Das Anordnen nach den Atomgewichten entspricht der *Periodizität* der Elemente und läßt zu einem gewissen Grade der Vorhersagekraft im chemischen Verhalten, z. B. Li, Be, B, C, N, O, F.
- Die in der Natur verbreitetsten Elemente haben *kleine* Atomgewichte.

Presented to Saint Petersburg State University
2012

Mendeleeff, the Periodic Table.

Spelling of his
name is as on
the paper itself.

メンデレーエフ：
元素の周期律表

名前のスペルはあえて
原著論文のまま
本来はMendeleev



Division of the History of Chemistry
American Chemical Society

Citation for Chemical Breakthrough



Watson, J. D.; Crick, F. H. C. *Nature* 1953, 171, 737-738.



We wish to put forward a radically different structure for the salt of deoxyribose nucleic acid. This structure has two helical chains each coiled round the same axis (see diagram).

The novel feature of the structure is the manner in which the two chains are held together by the purine and pyrimidine bases.

..... it is found that only specific pairs of bases can bond together. These pairs are: adenine (purine) with thymine (pyrimidine), and guanine (purine) with cytosine (pyrimidine).

It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material.

J. D. WATSON
F. H. C. CRICK

Medical Research Council Unit for the
Study of the Molecular Structure of
Biological Systems,
Cavendish Laboratory, Cambridge

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Presented to the Medical Research Council
Laboratory of Molecular Biology, Cambridge, England

2007

Watson & Crick, Structure of DNA

ワトソンと
クリック：
DNAの
二重らせん構造



Division of the History of Chemistry
American Chemical Society

Citation for Chemical Breakthroughs



That chlorofluoromethanes photodissociate in the stratosphere,
leading to the destruction of atmospheric ozone

Mario J. Molina and F. S. Rowland, *Nature* 1974, 249, 810-812.

Stratospheric sink for chlorofluoromethanes : chlorine atom-catalysed destruction of ozone

Mario J. Molina & F. S. Rowland

Department of Chemistry, University of California, Irvine, California 92664

Chlorofluoromethanes are being added to the environment in steadily increasing amounts. These compounds are chemically inert and may remain in the atmosphere for 40–150 years, and concentrations can be expected to reach 10 to 30 times present levels. Photodissociation of the chlorofluoromethanes in the stratosphere produces significant amounts of chlorine atoms, and leads to the destruction of atmospheric ozone.



It seems quite clear that the atmosphere has only a finite capacity for absorbing Cl atoms produced in the stratosphere, and that important consequences may result. This capacity is probably not sufficient in steady state even for the present rate of introduction of chlorofluoromethanes. More accurate estimates of this absorptive capacity need to be made in the immediate future in order to ascertain the levels of possible onset of environmental problems.

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Presented to the Department of Chemistry,
University of California, Irvine
2006

Molina and Rowland, ozone destruction

As an award in history
of science, the
plaques do not correct
original typographical
errors!

モリナとローランド：
オゾン層の破壊

原著論文のスペルミスも
そのまま盾に



Division of the History of Chemistry
American Chemical Society



Citation for Chemical Breakthrough

Journal of the American Chemical Society 1987, 109, 5356-5358.

Asymmetric Hydrogenation of β -Keto Carboxylic Esters. A Practical, Purely Chemical Access to β -Hydroxy Esters in High Enantiomeric Purity

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Kamata, Tokyo 144, Japan*

Received June 8, 1987

Optically active β -hydroxy carboxylic esters are an extremely important class of compounds for natural product synthesis. Access to such compounds has so far relied mainly on biological or biochemical transformations. Asymmetric hydrogenation of the keto group is an alternative complementary methodology, and the purely chemical means should allow a new degree of control of the chiral outcome at will, giving both enantiomers with equal ease.



Presented to Nagoya University, the Institute for Molecular Science, and Takasago International Corporation, 2021.

CONGRATULATIONS!

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YOUR AWARD!!!!!!



Division of the History of Chemistry
American Chemical Society

Citation for Chemical Breakthrough



Journal of the American Chemical Society 1987, 109, 5856-5858.

Asymmetric Hydrogenation of β -Keto Carboxylic Esters. A Practical, Purely Chemical Access to β -Hydroxy Esters in High Enantiomeric Purity

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H. Takaya

*Institute for Molecular Science
Myodaiji, Okazaki 444, Japan*

N. Sayo, H. Kumobayashi, and S. Akutagawa*

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Received June 8, 1987

Optically active β -hydroxy carboxylic esters are an extremely important class of compounds for natural product synthesis. Access to such compounds has so far relied mainly on biological or biochemical transformations.¹ Asymmetric hydrogenation of the keto esters is an alternative complementary methodology, and the purely chemical means should allow even easier control of the chiral outcome at will, giving both antipodes with equal ease.



Presented to Nagoya University, the Institute for Molecular Science, and Takasago International Corporation, 2021.