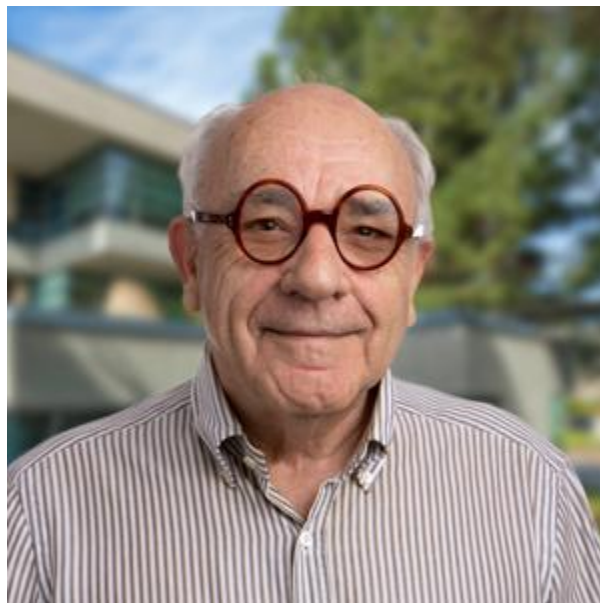


JULIUS REBEK, JR.



Director, The Skaggs Institute for Chemical Biology
and
Professor of Chemistry, Department of Chemistry
The Scripps Research Institute

Biographical Sketch

Julius Rebek, Jr. was born in Hungary in 1944 and lived in Austria from 1945-49. He and his family then settled in the U.S.A. in Kansas where they became naturalized U.S. citizens in 1954. He completed his undergraduate education at the University of Kansas in 1966, and received the Ph.D. degree from the Massachusetts Institute of Technology (1970) for studies in peptide chemistry with Professor D.S. Kemp. As an Assistant Professor at the University of California at Los Angeles (1970-1976) he devised the three-phase test for reactive intermediates. In 1976 he moved to the University of Pittsburgh where he rose to the rank of Professor of Chemistry and developed cleft-like structures for studies in molecular recognition. In 1989 he returned to the Massachusetts Institute of Technology, where he was the Camille Dreyfus Professor of Chemistry and introduced self-replicating synthetic molecules and encapsulation. In 1996, he moved his research group to The Scripps Research Institute to become the Director of The Skaggs Institute for Chemical Biology, where he continues to work in self-assembling systems and chemistry in small spaces. He was a Visiting Professor in the Chemistry Department of Fudan University, Shanghai, (2013-2016) under the Thousand Talents Program of China and is currently a Visiting Professor at Shanghai University.

Biographical Data

Birth date: April 11, 1944; Beregszasz, Hungary

Education: B.A. University of Kansas, 1966
Ph.D. Massachusetts Institute of Technology, 1970

Positions: University of California, Los Angeles
Assistant Professor, 1970-1976

University of Pittsburgh
Associate Professor, 1976-1979
Professor, 1980-1989

Massachusetts Institute of Technology, Cambridge, MA
Professor, 1989-1991
Camille Dreyfus Professor of Chemistry, 1991-1996

The Scripps Research Institute, La Jolla, CA
Director, The Skaggs Institute for Chemical Biology
and Professor of Chemistry, 1996-

Fudan University, Shanghai, China, 2013-2016
Professor of Chemistry, Thousand Talents Program

Shanghai University, Center for Supramolecular Chemistry and Catalysis,
Visiting Professor 2016-

Selected Honors and Awards

A. P. Sloan Fellow, 1976-1978
A. von Humboldt Fellow, 1981
J. S. Guggenheim Fellow, 1985
A.C. Cope Scholar Award, 1991
American Academy of Arts and Sciences, 1993
National Academy of Science, 1994
James Flack Norris Award in Physical Organic Chemistry, ACS, 1997
Hungarian Academy of Science, 2001
American Institute of Chemists, Chemical Pioneer Award, 2002
Ronald Breslow Award for Achievement in Biomimetic Chemistry, ACS 2004
European Academy of Science (Academia Europaea) Member, 2005
Distinguished Scientist Award, ACS, San Diego, California, 2006
University of Oregon Creativity Award in Chemistry, Dance and Music, 2007
Tau-Shue Chou Award, Academia Sinica, 2008
A. von Humboldt Senior Scientist Award, Germany, 2009
Honorary Doctorate, University of Bonn, 2010
Nichols Medal, ACS New York Section, 2011
Prelog Medal, ETH Zurich, 2012
Honorary Doctorate, University Jaume I, Castellon, Spain, 2015

Royal Swedish Academy of Sciences, Foreign Member, 2016
Honorary Cross for Science and Art (Ehrenkreuz) Vienna, Austria, 2017

Named Lectureships

Organic Synthesis, Inc. Lecturer, Notre Dame, 1986
J. Clarence Karcher Lecturer, University of Oklahoma, 1988
Frontiers of Science Lectures, Texas A & M University, 1989
Dow Lectures, Michigan State University, 1989
Merck Lecturer, University of Sherbrooke, 1990
Distinguished Lecture Series, University of Florida, 1990
Bender Lectures, Northwestern University, 1990
Abbot Lecturer, Yale University, 1991
H. M. Friedman Lecturer, Rutgers University, 1991
Phillips Lectures, Haverford College, 1991
Special Lecture Series, Scripps Research Institute, 1991
Organic Synthesis, Inc. Lecturer, Colorado State Univ. 1991
MIKI Keynote Lecturer, University of Kansas, 1991
Merck Lecturer, Lehigh University, 1992
Merck Lecturer, University of Montreal, 1992
Franklin Lecturer, University of Kansas, 1992
Bio Mega Lecturer, Montreal, 1993
Miles Lecturer, University of New Hampshire, 1993
Syntex Lecturer, University of Colorado, 1993
Wm. Rauscher Lecturer, Rensselaer Polytechnic, 1993
Seman Lecturer, Kent State University, 1994
Robert Robinson Memorial Lecturer, Oxford, 1994
Welch Foundation Lecturer, Texas Universities, 1994
Linus Pauling Lecturer, Stanford University, 1995
E. K. C. Lee Lecturer, UC Irvine, 1995
Kilpatrick Lecturer, Illinois Institute of Technology, 1996
Lord Lectureship, Allegheny College, 1996
Watkins Lectureship, Wichita State University, 1997
Hirschman Lecturer, Oberlin College, 1998
Oersted Lecturer, Technical University of Denmark at Lyngby, 1998
S.C. Lind Lectureship, University of Tennessee, Knoxville, 1998
Lyle Dawson Lecturer, University of Kentucky, 1998
Reynold Fuson Lectureship, University of Nevada, Reno, 1999
Brantford Chemicals Distinguished Lecturer, Queen's University, Canada, 1999
David Ginsburg Memorial Lecture, Israel Institute of Technology, Israel, 2000
Schlemper Distinguished Lecture in Chemistry, University of Missouri, 2000
Priestley Lecturer, Pennsylvania State University, 2000
Martino Steer Memorial Lecturer, Modena University, Italy, 2000
Treat B. Johnson Lecturer, Yale University, 2001
Lipscomb Lecturer, University of South Carolina, 2001
Gomberg Lecturer, University of Michigan, 2001
Guthikonda Lecture, Columbia University, 2001
Henry J. Shine Endowment Lectureship, Texas Tech University, 2001

Jack Fox Lecture, Memorial Sloan-Kettering Cancer Center, 2002
 Consensus Lecturer, Tufts University, 2002
 Woodward Scholar Lecturer, Harvard University, 2002
 Molecular Science Forum, Chinese Academy of Sciences, 2003
 Robert Levine Lecture, University of Pittsburgh, 2003
 ICI Lecture, Third Bristol Synthesis Meeting, Bristol, UK, 2003
 Inaugural Winstein Lecturer, University of California Los Angeles, 2004
 Evans Award Lecturer, Ohio State University, 2006
 Chemistry Day Lecturer, University of Montreal, 2006
 Chemistry Week Lecturer, Georgetown University, 2006
 Wyeth Lecturer, Princeton University, 2006
 Marker Lecturer, University of Maryland, 2007
 Haberman Lecturer, Marquette University, 2007
 Joullie Lecturer, University of Pennsylvania, 2008
 Tau-shue Chou Lecturer, Taipei, Taiwan, 2008
 Frontiers in Chemistry, Case Western Reserve, 2009
 Allergan Distinguished Lecturer, California State University, Long Beach, 2009
 Frontiers of Chemistry Lectures, Texas A&M University, 2010
 Kohler Lectures, UC Riverside, 2010
 Nichols Award Lecture, New York, 2011
 International Year of Chemistry Lecture, University of Miami, 2011
 George Buechi Lectures, MIT, 2012
 Slayton Evans Lecturer, Univ. N. Carolina, 2012
 William Pyle Philips Distinguished Visitor in Chemistry, Haverford College, 2012
 Prelog Lecture, ETH, Switzerland 2012
 Mahler Distinguished Lecturer, Univ. Texas Austin, 2013
 Frontiers of Chemistry Lecturer, Wayne State Univ., 2014
 Frontiers in Organic Chemistry Lecturer, Univ. of Illinois, 2014
 Institute for Advanced Studies Lecturer, HKUST, Hong Kong, 2015
 Inaugural Roenigk Lecturer, Ohio Univ. 2016

Recent Lectures at Universities and Companies

- 2012 Czech. Acad. of Science, Prague; Roche, Mannheim; Univ. N. Carolina; Duke U.; Haverford College; Tulane U.; MIT; Boston College; U. Mass. Amherst; Univ. of Cambridge; National Defense U. (visit at Scripps); Univ. of Geneva; CEA, Grenoble; E. N. S., Lyon; Bielefeld U.; Stockholm U.; Uppsala U.; Roche, Basel; Univ. of Basel; ETH, Zurich.
- 2013 Univ. of Texas, Austin; Univ. of California, San Diego; Fudan Univ., Zhejiang Univ., Nanjing Univ., East China Normal U., China; Bowie State U., Maryland.
- 2014 Wayne State Univ.; Shanghai Normal Univ., East China Normal Univ., ISMSC at SIOC, Shanghai; Univ. Utrecht; NORM, Univ. Montana;

ICIQ Tarragona, Univ. Castellon, Univ. of Valencia, Spain; ISACS, U.C. San Diego; Beijing Normal Univ., CAS, Nankai Univ., Northwest China Univ. Xian, China; Univ. of Illinois; Princeton Univ.

- 2015 Virginia Tech. Univ.; South University of Science and Technology, Shenzhen; Hong Kong Univ.; Hong Kong University of Science and Technology; Sun Yat-Sen Univ., Guangdong, China; Univ. of Barcelona; Washington Univ., St. Louis; Fukuoka Univ, Hiroshima Univ., Japan; Univ. Jaume I, Castellon, Spain; Pacificchem, Hawaii.
- 2016 ACS, San Diego; Shanghai Jiao Tong Univ.; Ohio Univ.; San Diego State Univ.; ISXB-2 Conference, Gothenburg; Shanghai Univ.; ICREA Conference, Tarragona; Univ. of Girona, Spain; Lund Univ. Sweden; U.C. San Diego; Shanghai U. Symposium; Qecote, Zhejiang, China.
- 2017 Sorbonne, Univ. of Paris; Zhejiang Normal U.; Henan U.; Nanjing Tech. U.; Yunnan U., China; Univ. Paris VI.
- 2018 Shanghai Normal Univ.; East China Normal Univ.; ACS. New Orleans; Fudan Univ.; Tong Ji Univ.; San Diego State Univ.; Gif-Sur-Yvette; ISMSC Quebec; ICCS Sendai; Kanazawa U.;

Research Interests

Self-Assembling and Self-Replicating Systems, Molecular Encapsulation, Nerve Agent Antidotes and Sensors, Organic reactions in water.

Editorial Advisory Boards:

Journal of Molecular Recognition, 1987-1995
Chemtracts, 1987-1996
Bioorganic and Medicinal Chemistry Letters, 1991-2001
Bioorganic and Medicinal Chemistry, 1991-2001
Journal of the Chemical Society, Perkin Transactions, 1992-1998
Chemistry and Biology, 1994-
Accounts of Chemical Research, 1996-1998
Journal of Organic Chemistry, 1996-2000
Current Opinion in Chemical Biology, 1997-2016
Tetrahedron Publications, 1991-2001
Progress in Physical Organic Chemistry, 1998-2002
Journal of Supramolecular Chemistry, 2001-
European Journal of Organic Chemistry, 2004-2014

Scientific Advisory Boards:

Commercial

Amira (RepliGen), Cambridge, Massachusetts 1990 -1994
Procept, Cambridge, Massachusetts 1991-1997
Darwin Molecular, Seattle, Washington 1992-1995
Cubist Pharmaceuticals, cofounder (now Merck) Cambridge MA. 1992-2001

Discovery Partners International, La Jolla, California, 1996-2001
EPIgen, La Jolla, California, 1996-2001
Synteni (Incyte), Fremont, California, 1997-2001
LaunchCyte, Pittsburgh, PA, 2000-2002
Neogenesis, (cofounder), Cambridge, Massachusetts, 1997-2003
Personal Chemistry, Uppsala, Sweden, 1999-2003
Activx, La Jolla, CA, 2001-2004
Kémia, (cofounder), La Jolla, CA, 2002-2008

Academic

University of Chicago, Physical Sciences Division SAB, Chicago, Illinois, 2000-2006
National Cancer Institute, National Institutes of Health, Bethesda, MD, 2001-2004
The Institute of Chemical Research of Catalonia, (ICIQ) Tarragona, Spain, 2001-
Elector, University of Oxford, Chair in Chemical Biology, 2001
Center for Integrated Protein Science, Munich, 2009-

Governmental

Board on Chemical Sciences and Technology, National Research Council, 1992.

Wittgenstein Prize and START Award Jury, Vienna, Austria: 2008 – 2017 (chairman, 2016 – 2017).

Committee to Assess Supercritical Water Oxidation System Testing for the Blue Grass Chemical Agent Destruction Pilot Plant, National Research Council, 2012-2013.

Standing Committee on Chemical Demilitarization, Board on Army Science and Technology, National Academy of Sciences, 2013-2016.

Intelligence Science and Technology Experts Group, (ISTEG) The National Academies of Sciences, Engineering, and Medicine, 2015 -

Visiting Professorships:

Technical University of Munich, Germany, 1981
University of Castellon, Spain, 1986
Ecole Normal Superior, Paris, 1997
Harvard University, 2002
University of Paris V, 2008
LMU, Munich, 2009
Free University of Berlin, Germany, 2009
Fudan University, Shanghai, China, 2013-2016
Shanghai University, Shanghai, China, 2016-

PUBLICATIONS

1. D. S. Kemp and Julius Rebek, Jr. Peptide Racemization Mechanism. A Kinetic Isotope Effect as a Means of Distinguishing Enolization from Oxazolone Formation, *J. Am. Chem. Soc.* **1970**, *92*, 5792.
2. D. S. Kemp, Zmira Bernstein and Julius Rebek, Jr. Racemization during Peptide Couplings Using the Mixed Anhydride, N-Hydroxysuccinimide Ester, 8-Hydroxyquinoline Ester, and Acyl Azide Methods, *J. Am. Chem. Soc.* **1970**, *92*, 4756.
3. Julius Rebek and David Feitler, An Improved Method for the Study of Reaction Intermediates. The Mechanism of Peptide Synthesis Mediated by Carbodiimides, *J. Am. Chem. Soc.* **1973**, *95*, 4052.
4. Julius Rebek and David Feitler, Mechanism of the Carbodiimide Reaction II. Peptide Synthesis on the Solid Phase, *J. Am. Chem. Soc.* **1974**, *96*, 1606.
5. William R. Roush, David Feitler and Julius Rebek, Jr. Polymer-Bound Tosyl Azide, *Tetrahedron Lett.* **1974**, 1391.
6. Julius Rebek, Jr. Stephen F. Wolf and Allen B. Mossman, Substituted Peroxycarbamic Acids as Epoxidizing Agents, *J. Chem. Soc. Chem. Comm.* **1974**, 711.
7. J. Rebek and F. Gavina, The Three-Phase Test for Reactive Intermediates. Cyclobutadiene, *J. Am. Chem. Soc.* **1974**, *96*, 7112.
8. D. S. Kemp, S.-W. Wang, J. Rebek, Jr. R. C. Mollan, C. Banquer and G. Subramanyam, Peptide Synthesis with Benzisoxazolium Salts--II. Activation Chemistry of 2-ethyl-7-hydroxybenzisoxazolium Fluoroborate; Coupling Chemistry of 3-acyloxy-2-hydroxy-N-ethylbenzamides, *Tetrahedron*, **1974**, *30*, 3955.
9. D. S. Kemp, S. J. Wrobel, Jr. S.-W. Wang, Z. Bernstein and J. Rebek, Jr. Peptide Synthesis with Benzisoxazoline Salts--III. Utility of 7-hydroxy-2-ethyl-benzisoxazolium Fluoroborate in the Synthesis of Peptides, *Tetrahedron*, **1974**, *30*, 3969.
10. Julius Rebek, David Brown and Stephen Zimmerman, The Three-Phase Test for Reaction Intermediates. Nucleophilic Catalysis and Elimination Reactions, *J. Am. Chem. Soc.* **1975**, *97*, 454.
11. J. Rebek and F. Gavina, The Three-Phase Test for Reaction Intermediates. Metaphosphates, *J. Am. Chem. Soc.* **1975**, *97*, 1591.
12. J. Rebek and D. Feitler, Peptide Synthesis with Carbodiimide. III. Racemization, *Int. Peptide Protein Res.* **1975**, *7*, 167.
13. J. Rebek, Mechanisms of Peptide Synthesis with Carbodiimides, in *Peptides 1974*, Proceedings of the Thirteenth European Peptide Symposium, Kiryat Anavim Israel, April 28- May 3, 1974. Edited by Yechezkel Wolman, John Wiley & Sons, New York (**1975**), p. 27.

14. J. Rebek and F. Gavina, The Three-Phase Test for Reaction Intermediates. Evidence for Monomeric Metaphosphates, *J. Am. Chem. Soc.* **1975**, *97*, 3221.
15. Julius Rebek, Jr. and F. Gavina, The Three-Phase Test. Detection of Free Cyclobutadiene, *J. Am. Chem. Soc.* **1975**, *97*, 3453.
16. J. Rebek, S. Zimmerman and D. Brown, New Probes for the Study of Acylation Reactions, *J. Am. Chem. Soc.* **1975**, *97*, 4407.
17. J. W. Goers, V. N. Schumaker, M. M. Glovsky, J. Rebek and H. J. Muller-Eberhard, Complement Activation by a Univalent Hapten-Antibody Complex, *J. Biol. Chem.* **1975**, *250*, 4918.
18. J. Rebek, D. Brown and S. Zimmerman, The Mechanism of the Carbodiimide Reaction, IV, *Peptides: Chemistry, Structure and Biology*, R. Walter and J. Meienhofer, Eds. Ann Arbor Michigan, **1975**, p. 371.
19. J. Rebek and D. Brown, Nucleophilic Catalysis of Acyl Transfers, *Peptides 1976*, A Loffet, Ed. Brussels Univ. Press, Brussels, Belgium, **1976**, p. 61.
20. J. Rebek, F. Gavina, D. Brown and S. Zimmerman, The Three-Phase Test for Reactive Intermediates, *Polym. A.C.S. Div. Polym. Chem.* **1976**, *17*, 230.
21. L. T. Scott, J. Rebek, L. Ovsyanko and C. Sims, Organic Chemistry on the Solid Phase: Site-Site Interactions on Functionalized Polystyrene, *J. Am. Chem. Soc.* **1977**, *99*, 625.
22. J. Rebek and J.-C. Gehret, Progress on the Synthesis of Mitosenes, *Heterocycles*, **1977**, *6*, 1531.
23. J. Rebek, F. Gavina and C. Navarro, The Three-Phase Test: The Conant-Swan Reaction, *Tetrahedron Lett.* **1977**, 3021.
24. J. Rebek and J.-C. Gehret, A Synthetic Approach to the Mitosenes, *Tetrahedron Lett.* **1977**, 3027.
25. J. Rebek, S. Wolf and A. Mossman, Singlet Oxygen and Epoxidation from the Dehydration of Hydrogen Peroxide, *J. Org. Chem.* **1978**, *43*, 180.
26. J. Rebek and J. E. Trend, On Binding to Transition States and Ground States: Remote Catalysis, *J. Am. Chem. Soc.* **1978**, *100*, 4315.
27. S. Wolf, C. S. Foote and J. Rebek, Chemistry of Singlet Oxygen. XXIX. A Specific Three-Phase Kautsky Test for Singlet Oxygen, *J. Am. Chem. Soc.* **1978**, *100*, 7770.
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30. J. Rebek and J. E. Trend, On the Rate of Site-Site Interactions in Functionalized Polystyrenes, *J. Am. Chem. Soc.* **1979**, *101*, 737.
31. J. Rebek and R. McCready, A New Class of Epoxidation Reagents, *Tetrahedron Lett.* **1979**, 1001.
32. J. Rebek, R. McCready, S. Wolf and A. Mossman, New Oxidizing Agents from the Dehydration of Hydrogen Peroxide, *J. Org. Chem.* **1979**, *44*, 1485.
33. J. Rebek, Mechanistic Studies Using Solid Supports: The Three-Phase Test, Tetrahedron Reports, #60, *Tetrahedron*, **1979**, *35*, 723.
34. J. Rebek, R. V. Wattlely, S. Chakravorti and J. E. Trend, Allosteric Effects in Organic Chemistry: Site-Specific Binding, *J. Am. Chem. Soc.* **1979**, *101*, 4333.
35. J. Rebek and R. McCready, New Epoxidation Reagents Derived from Alumina and Silicon, *Tetrahedron Lett.* **1979**, 4337.
36. Joseph A. Horton, Charles Kerber, John M. Herron, Julius Rebek, Reduction of Edge Position Uncertainty on Computed Tomographic (CT) Scans, *Proc. Soc. Phot. Instr. Eng.* **1979**, Vol. 207, p. 222-223.
37. J. Rebek and R. V. Wattlely, New Macrocyclic Polyethers with Remote Binding Sites, *J. Het. Chem.* **1980**, *17*, 749-751.
38. J. Rebek and R. V. Wattlely, Allosteric Effects: Remote Control of Ion Transport Selectivity, *J. Am. Chem. Soc.* **1980**, *102*, 4853-54.
39. J. Rebek and R. McCready, Olefin Epoxidation with α -Substituted Hydroperoxides, *J. Am. Chem. Soc.* **1980**, *102*, 5602-5605.
40. J. Rebek, Jr. and Y. K. Shue, Total Synthesis of Rugulovasines, *J. Am. Chem. Soc.* **1980**, *102*, 5426-27.
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43. J. Rebek, Jr. and R. McCready, Intermolecular Epoxidation with the H₂O/Ortho Ester System, *Tetrahedron Lett.* **1980**, *21*, 2491.
44. J. Rebek, Jr. R. V. Wattlely, T. Costello, R. Gadwood and L. Marshall, On Binding in Subunit Systems, *J. Am. Chem. Soc.* **1980**, *102*, 7398-7400.

45. J. Rebek, Jr. and Steven Shaber, Recent Progress Toward the Synthesis of Mitosenes, *Heterocycles*, **1981**, *15*, 161-163.
46. J. Rebek, Progress in the Development of New Epoxidation Reagents, *Heterocycles*, **1981**, *15*, 517-545.
47. J. Rebek, Jr. and S. Shaber, Total Synthesis of a Mitosene *Heterocycles*, **1981**, *15*, 1173-1177.
48. J. Rebek, Jr. R. V. Wattlely, T. Costello, R. Gadwood and L. Marshall, Allosteric Effects: Binding Cooperativity in a Subunit Model, *Angew. Chem. Int.* **1981**, *93*, 584-585.
49. J. Rebek, Jr. and Y. K. Shue, An Informal Synthesis of \pm Lysergine, *Tetrahedron Lett.* **1982**, *23*, 279-280.
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51. J. Rebek, Jr. and Dar-Fu Tai, Synthesis of Setoclavine *Heterocycles*, **1983**, *20*, 583-584.
52. J. Rebek, Jr. and Luann Marshall, Allosteric Effects: An On-Off Switch, *J. Am. Chem. Soc.* **1983**, *105*, 6668-6670.
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58. J. Rebek, Jr. and T. Costello, Binding Forces and Catalysis: Rate Enhancements Through Chelation at a Remote Site, *Heterocycles*, **1984**, *22*, 2191-2194.
59. J. Rebek, Jr. S. H. Shaber, Y. K. Shue, J. C. Gehret and S. Zimmerman, The Total Synthesis of a Mitosene, *J. Org. Chem.* **1984**, *49*, 5164-5174.

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63. J. Rebek, Jr. T. Costello, L. Marshall, R. Wattle, R. Gadwood, and K. Onan, Allosteric Effects in Organic Chemistry: Binding Cooperativity in a Model for Subunit Interactions, *J. Am. Chem. Soc.* **1985**, *107*, 7481-7487.
64. J. Rebek, Jr. T. Costello, R. Wattle, Binding Forces and Catalysis - The Use of Bipyridyl-Metal Chelation to Enhance Reaction Rates, *J. Am. Chem. Soc.* **1985**, *107*, 7487-7493.
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66. J. Rebek, Jr. S. Luis and L. R. Marshall, Slow Complexation Rates of Crown Ethers: What's Taking So Long?, *J. Am. Chem. Soc.* **1986**, *108*, 5011-5012.
67. J. Rebek, Jr. and D. Nemeth, Molecular Recognition: Ionic and Aromatic Stacking Interactions Bind Complementary Functional Groups in a Molecular Cleft, *J. Am. Chem. Soc.* **1986**, *108*, 5637-5638.
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81. K. S. Jeong and Julius Rebek, Jr. Molecular Recognition: Hydrogen Bonding and Aromatic Stacking Converge to Bind Cytosine Derivatives, *J. Am. Chem. Soc.* **1988**, *110*, 3327-3328.
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