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Knowledge Inn (in nature)

Research Profile of Elias James Corey (Nobel Laureate)

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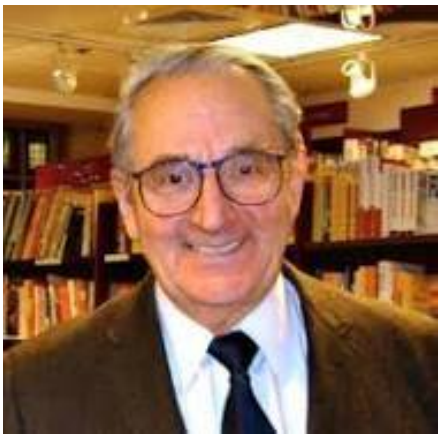
Elias James Corey

Born on 12 July 1928

Methuen, Massachusetts, United States



Affiliation

Harvard University, Cambridge, MA, USA

h-index	**140**	
Research papers	246	Up to2016; High-probability publications
	1048	From 1950-2011

Nobel Prize in Chemistry	**Retrosynthetic analysis development of the theory and methodology of organic synthesis** **For the greatest benefit to humankind**	**1990**

Typical Book titles ofElias James Corey
The Logic of Chemical Synthesis. E. J. Corey and Xue-Min Cheng. John Wiley & Sons Ltd, Chichester, 1989. 436 pp.
Molecules and Medicine E. J. Corey, E. J. Corey, Czakó, Barbara, Lárti, szló, Amazon.com Services LLC
Enantioselective Chemical Synthesis, Methods, Logic, and Practice, Elias J. Corey Laszlo Kurti, 1st Edition, Hardcover ISBN: 9780615395159, Imprint: Academic Press, 15th October 2013, pages: 334

Academic profile ofElias James Corey		
High School	1945	Lawrence High School, Lawrence, MA
Education (MIT : 1945-1950)		
BS Organic Chemistry	1948	Massachusetts Institute of Technology
PhD Chemistry	1951	Massachusetts Institute of Technology

Employment. Elias James Corey		
Faculty member at the University of Illinois (1951 to 1959)		
1951	Instructor, University of Illinois at Urbana-Champaign	
1954	Assistant professor	
1956	Full professor University of Illinois at Urbana-Champaign	
1957	Guggenheim Fellowship: Harvard University on sabbatical leave	
1958	Fellow: Chemistry, Royal Caroline Institute	
	Faculty member at Harvard University (1959-)	
1959-	Professor: Chemistry, Harvard University	
1965	Chairman of the department & Sheldon Emory Professor of Organic Chemistry	

	Post-Doc career
1948	John C. Sheehan's program on synthetic penicillins, after his graduation
1951	Instructor in chemistry under Roger Adams and Carl S. Marvel at University of Illinois at Urbana-Champaign He began his work in physical organic chemistry, developing stereo-electronic ideas which are

	still used even today Corey began working on his own at Illinois by applying theories of electron density in molecules and transition states (known as molecular orbital theory) to make predictions about reaction products
	Supervising graduate students
1954	After getting promotion as assistant professor, he started supervising graduate students in experimental projects involving the structure, stereochemistry, and synthesis of complex naturally occurring organic compounds. His success was astounding; promoted to full professor in 1956, at age 27. His research group grew and its activities included new areas of synthesis, metal complexes and enzyme chemistry
	Fellowship & sabbatical leave
1957	During Guggenheim Fellowship period (divided between Harvard and Europe), several key ideas about chemical synthesis emerged. He went first to Robert B. Woodward (on invitation) at Harvard University; then to Switzerland, England, and finally to Sweden. While researching with SuneBergström, he became intrigued by prostaglandins. Corey synthesized prostaglandins in the mid 1960s.

Awards (to) Elias James Corey

Nobel Prize in Chemistry	**Retrosynthetic analysisdevelopment of the theory and methodology of organic synthesis** **For the greatest benefit to humankind**	**1990**

Award	year
ACS Linus Pauling Medal	1973
Benjamin Franklin Medal	1978
Wolf Prize in Chemistry	1986
RSC Robert Robinson Medal	1988
Priestley Medal	2004
……. 70 awards	

Press release

- 🕮 No other chemist than Corey has developed such a comprehensive assortment of methods… in the synthesizing laboratory
- 🕮 A father of modern organic synthesis

Expertise

- Molecular synthesis
- Development of several new synthetic reagents
- Methodology of organic synthesis
- Significantly improved on the science of organic synthesis
- Corey-Bakshi-Shibata reaction for the reduction of ketones to secondary alcohols

- Computer software + Synthesis
- One among the first few chemists to use computer analysis to design chemical syntheses
- Corey went on to pioneer the use of computers in retrosynthetic analysis

	Retrosynthetic Analysis (October 1957 to 1970)
Traditional syntheses	o Starts with simple (or at least readily available) molecules i.e.building blocks o Assembled by a sequence of reactions o Final step leading to formation of the desired (complicated) target molecule
Retrosynthetic analysis	Phase I o Breaking a target molecule theoretically into simpler precursor structures o Continuing the disassembly process until simple starting materials were arrived at Phase II o Stepwise synthesis o A combination of intelligent selection step based on known reactions of related molecules o Experimental trial and error method tried until successful
Outcome	- This synthetic strategy subsequently became the standard norm for organic synthesis - Developed more than one hundred synthetic reactions and transformations by himself - Development of numerous medicinal drugs, including prostaglandins and ginkgolide - Generation of potential synthetic pathways - Computer-assisted synthetic analysis grown into a new paradigm; widespread; now indispensable omnipotent tool

Elias James Corey (Open-heart musings)

- I have always been guided by a desire to be a worthy son to the fatherand courageous mother who raised me
- Though my given name was William James Corey, my mother (FatinaHasham Corey b. 1900,

d. 1970) renamed me Elias after my father's death (businessman, d. 1930)due to pneumoniajust eighteen months after my birth.

- My aunt taught me to be efficient and to take pleasure in a job well done, no matter how mundane.
- In 1945,I entered MIT in engineering. I was a keen mathematician.But, soon became a convert to organic chemistry, with its "intrinsic beauty and great relevance to human health"
- Wife: Claire Higham Corey (Graduate from University of Illinois; m. Sep-1961)
- Son: David Reid Corey (Biochemist, b. 1963)
- Son: John Corey (b. 1965)
- Daughter: Susan Corey (Anthropologist, b. 1967)

b: born; d:dead; m:married

Source: Elias J. Corey's speech at the Nobel Banquet, December 10, 1990

There is a children's poem by Julia Carney entitled "Little Things" ; one verse of which reads:

Little drops of water, little grains of sand
Make the mighty ocean and the pleasant land
Thus the little minutes, humble though they be
Make the mighty ages of eternity.

- It is by countless small steps, like the little grains of sand, that we endeavor to understand ourselves and our universe, though confronted by endless complexity
- Whatever our field – science, technology, humanities, art – we are excited by the challenge of research at an endless frontier
- And also humbled by the vastness of our ignorance
- We are heartened by the belief that knowledge, if wisely used, can benefit mankind

- Naturally occurring organic substances are the basis of all life on earth
- Science at the molecular level defines a fundamental language of life
- Most of today's medicines are synthetic
- Really, majority of tomorrow's will be conceived and produced by synthetic chemists
- The knowledge of synthetic chemistry is a probe for the attainment of a deep understanding of matter, chemical change and life

Select titles ofresearch output ofElias James Corey
high impact (# citations) publications

Year	Publication
2016	Mahender Reddy K, Bhimireddy E, Thirupathi B, Breitler S, Yu S, **Corey EJ**. Cationic Chiral Fluorinated Oxazaborolidines. More Potent, Second Generation Catalysts for Highly Enantioselective Cycloaddition Reactions. *Journal of the American Chemical Society*. PMID 26812167 DOI: 10.1021/jacs.6b00100
2015	Rajendar G, **Corey EJ**. A systematic study of functionalized oxiranes as initiating groups for

	cationic polycyclization reactions. *Journal of the American Chemical Society*. 137: 5837-44. PMID 25871500 DOI: 10.1021/jacs.5b03229
2014	Han Y, Ma Y, Keresztes I, Collum DB, **Corey EJ**. Preferential geminal bis-silylation of 3,4-benzothiophane is caused by the dominance of electron withdrawal by R3Si over steric shielding effects. *Organic Letters*. 16: 4678-9. PMID 25157594 DOI: 10.1021/ol502348y
2014	Surendra K, **Corey EJ**. Diiodoindium(III) cation, InI_2^+, a potent yneophile. Generation and application to cationic cyclization by selective π-activation of C≡C. *Journal of the American Chemical Society*. 136: 10918-20. PMID 25095905 DOI: 10.1021/ja506502p
2013	Li JJ, **Corey EJ**. Drug Discovery: Practices, Processes, and Perspectives *Drug Discovery: Practices, Processes, and Perspectives*. DOI: 10.1002/9781118354483
2013	**Corey EJ**, Kurti L. Enantioselective Chemical Synthesis: Methods, Logic, and Practice *Enantioselective Chemical Synthesis: Methods, Logic, and Practice*. 1-328.
2012	Newhouse TR, Li X, Blewett MM, Whitehead CM, **Corey EJ**. A tetradentate ligand for the enantioselective Ti(IV)-promoted oxidation of sulfides to sulfoxides: origin of enantioselectivity. *Journal of the American Chemical Society*. 134: 17354-7. PMID 23046346 DOI: 10.1021/ja305991k
2012	Surendra K, **Corey EJ**. Highly enantioselective proton-initiated polycyclization of polyenes. *Journal of the American Chemical Society*. 134: 11992-4. PMID 22780430 DOI: 10.1021/ja305851h
2011	Qiu WW, Surendra K, Yin L, **Corey EJ**. Selective formation of six-membered oxa- and carbocycles by the In(III)-activated ring closure of acetylenic substrates. *Organic Letters*. 13: 5893-5. PMID 21992657 DOI: 10.1021/ol202621g
2011	Liang H, Hu L, **Corey EJ**. Di-tert-butylisobutylsilyl, another useful protecting group. *Organic Letters*. 13: 4120-3. PMID 21744824 DOI: 10.1021/ol201640y
2011	Li JJ, **Corey EJ**. Name Reactions in Heterocyclic Chemistry II *Name Reactions in Heterocyclic Chemistry Ii*. DOI: 10.1002/9781118092828
2010	Shenvi RA, **Corey EJ**. Synthetic access to bent polycycles by cation-pi cyclization. *Organic Letters*. 12: 3548-51. PMID 20670018 DOI: 10.1021/ol101410g
2009	Baqi Y, Giroux S, **Corey EJ**. A study of the epoxidation of cycloolefins by the t-BuOH copper-permanganate system. *Organic Letters*. 11: 959-61. PMID 19182889 DOI: 10.1021/ol802923n
2008	Giroux S, **Corey EJ**. Enantioselective synthesis of a simple benzenoid analogue of glycinoeclepin A. *Organic Letters*. 10: 5617-9. PMID 19007174 DOI: 10.1021/ol8024633
2007	Ryu DH, Kim KH, Sim JY, **Corey EJ**. Catalytic enantioselective Diels-Alder reactions of furans and 1,1,1-trifluoroethyl acrylate *Tetrahedron Letters*. 48: 5735-5737. DOI: 10.1016/j.tetlet.2007.06.097
2006	Mushti CS, Kim JH, **Corey EJ**. Total synthesis of antheliolide A. *Journal of the American Chemical Society*. 128: 14050-2. PMID 17061886 DOI: 10.1021/ja066336b
2005	Reddy LR, **Corey EJ**. Facile air oxidation of the conjugate base of rofecoxib (Vioxx™), a possible contributor to chronic human toxicity *Tetrahedron Letters*. 46: 927-929. DOI: 10.1016/j.tetlet.2004.12.055

2005	Li JJ, **Corey EJ**. Name Reactions in Heterocyclic Chemistry *Name Reactions in Heterocyclic Chemistry*. 1-558. DOI: 10.1002/0471704156
2000	Busch-Petersen J, **Corey EJ**. Lithium N-trityl-N-(R)-1-phenethylamide, a readily available and useful base for the enantioselective formation of chiral enolates from achiral ketones *Tetrahedron Letters*. 41: 6941-6944.
1999	Han X, **Corey EJ**. A catalytic enantioselective total synthesis of (-)-wodeshiol. *Organic Letters*. 1: 1871-2. PMID 10836046
1996	**Corey EJ**, Matsuda SP, Baker CH, Ting AY, Cheng H. Molecular cloning of a Schizosaccharomyces pombe cDNA encoding lanosterol synthase and investigation of conserved tryptophan residues. *Biochemical and Biophysical Research Communications*. 219: 327-31. PMID 8604986 DOI: 10.1006/bbrc.1996.0232
1995	**Corey EJ**, Roberts JD. John Clark Sheehan - September 23, 1915-March 21, 1992 *Biographical Memoirs. National Academy of Sciences (U.S.)*. 68: 291-302. PMID 11616354
1983	Systemic hemodynamic effects of leukotrienes C4 and D4 in the rat American Journal of Physiology - Heart and Circulatory Physiology Published 1 April 1983 Vol. 244 no. 4, H628-H633
1982	Drazen JM, Venugopalan CS, Austen KF, Brion F, **Corey EJ**. Effects of leukotriene E on pulmonary mechanics in the guinea pig. *The American Review of Respiratory Disease*. 125: 290-4. PMID 6279000
1981	Levine L, Morgan RA, Lewis RA, Austen KF, Clark DA, Marfat A, **Corey EJ**. Radioimmunoassay of the leukotrienes of slow reacting substance of anaphylaxis. *Proceedings of the National Academy of Sciences of the United States of America*. 78: 7692-6. PMID 6950409
1980	Rådmark O, Malmsten C, Samuelsson B, Clark DA, Goto G, Marfat A, **Corey EJ**. Leukotriene A: stereochemistry and enzymatic conversion to leukotriene B. *Biochemical and Biophysical Research Communications*. 92: 954-61. PMID 6244821 DOI: 10.1016/0006-291X(80)90795-0
1976	**Corey EJ**, Narasaka K, Shibasaki M. A direct,stereocontrolled total synthesis of the 9,11-azo analogue of the prostaglandin endoperoxide, PGH2. *Journal of the American Chemical Society*. 98: 6417-8. PMID 965655
1975	**Corey EJ**, Ensley HE. Letter: Preparation of an optically active prostaglandin intermediate via asymmetric induction. *Journal of the American Chemical Society*. 97: 6908-9. PMID 1184891
1972	**Corey EJ**, Snider BB. A total synthesis of ( )-fumagillin. *Journal of the American Chemical Society*. 94: 2549-50. PMID 5016935
1972	**Corey EJ**, Becker KR, Varma RK. Efficient generation of the 15S configuration in prostaglandin synthesis. Attractive interactions in stereochemical control of carbonyl reduction. *Journal of the American Chemical Society*. 94: 8616-8. PMID 4638997
1969	**Corey EJ**, Wipke WT. Computer-assisted design of complex organic syntheses. *Science (New York, N.Y.)*. 166: 178-92. PMID 17731475 DOI: 10.1126/science.166.3902.178
1969	**Corey EJ**, Lin K, Yamamoto H. Separation of the cyclization and rearrangement processes of lanosterol biosynthesis. Enzymic conversion of 20,21-dehydro-2,3-oxidosqualene to a dehydroprotosterol. *Journal of the American Chemical Society*. 91: 2132-4. PMID 5784177

1967	**Corey EJ**, Ortiz de Montellano PR, Lin K, Dean PD. 2,3-iminosqualene, a potent inhibitor of the enzymic cyclization of 2,3-oxidosqualene to sterols. *Journal of the American Chemical Society*. 89: 2797-8. PMID 6043808
1967	**Corey EJ**, Ortiz de Montellano PR. Enzymic synthesis of beta-amyrin from 2,3-oxidosqualene. *Journal of the American Chemical Society*. 89: 3362-3. PMID 6042774

Year	Publication
1959	Proof of the Structure and Stereochemistry of α-Amyrin by Synthesis from a β-Amyrin Derivative, Glycyrrhetic Acid. **Corey, E.** J.; Cantrall, E. W. Department of Chemistry, University of Illinois, Urbana, IL, USA. Journal of the American Chemical Society (1959), 81(7), pp. 1745-1751.
1957	Total Synthesis of Pentacyclosqualene. **Corey, E. J**.; Sauers, R. R. Department of Chemistry, University of Illinois, Urbana, IL, USA. Journal of the American Chemical Society (1957), 79(14), pp. 3925-3926.
1954	The Stereochemistry of α-Haloketones. V. Prediction of the Stereochemistry of α-Brominated Ketosteroids. **Corey, Elias J**. Department of Chemistry, University of Illinois, Urbana, IL, USA. Journal of the American Chemical Society (1954), 76(1), pp. 175-179.
1953	Prediction of the Stereochemistry of Alpha-brominated Ketosteroids. **Corey, E. J.** Department of Chemistry, University of Illinois, Urbana, IL, USA. Experientia (became Cellular and Molecular Life Sciences in 1997) (1953), 9(9), pp. 329-331.
1952	Syntheses and Reactions of Acyclic N,N-diacylglycines. Sheehan, John C.; **Corey, Elias J**. Department of Chemistry, Massachusetts Institute of Technology, Cambridge, MA, USA. Journal of the American Chemical Society (1952), 74(18), pp. 4555-4559.
1951	The Synthesis of Substituted Penicillins and Simpler Structural Analogs. VI. The Synthesis of a 6-Phenylacetylamino-β-lactam-thiazolidine. Sheehan, John C.; **Corey, Elias J.** Department of Chemistry, Massachusetts Institute of Technology, Cambridge, MA, USA. Journal of the American Chemical Society (1951), 73(10), pp. 4756-4759.
1950	The Total Synthesis of a 5-Phenylpenicillin: Methyl 5-Phenyl-(2-carbomethoxyethyl)-penicillinate. Sheehan, John C.; Buhle, Emmett L.; **Corey, Elias J.;**Laubach, Gerald D.; Ryan, James J. Department of Chemistry, Massachusetts Institute of Technology, Cambridge, MA, USA. Journal of the American Chemical Society (1950), 72(8), pp. 3828-3829

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