Matthew D. Shair

Department of Chemistry and Chemical Biology
Harvard University
12 Oxford Street, Cambridge, MA 02138
Voice: (617) 495-5008
Fax: (617) 496-4591
Email: Shair@Chemistry.Harvard.Edu
http://www.people.fas.harvard.edu/~shair/

Born: 4/24/68
Boston, MA

Research Focus: Organic synthesis and chemical biology.

APPOINTMENTS Harvard University, Department of Chemistry and Chemical Biology

1997 Assistant Professor
2001 Associate Professor
2002 Professor (with Tenure)

Founding Faculty Member: **Harvard Institute for Chemistry and Cell Biology** with S.L. Schreiber, T.J. Mitchison, M. Kirschner, G. L. Verdine, R. Ward, and E. N. Jacobsen, see: http://www.hms.harvard.edu/iccb/

EDUCATION

1995-1997: **Harvard University**
National Institutes of Health Postdoctoral Fellow.
Research advisor: Professor Stuart L. Schreiber

1993-1995: **Columbia University**; Ph.D. in Organic Chemistry
1990-1993: **Yale University**; M.S.
Research advisor: Professor Samuel J. Danishefsky
Total Synthesis of Dynemicin A.

1986-1990: **University of Rochester**; B.S. in Chemistry *with distinction*

AWARDS

- ACS Arthur C. Cope Young Scholar Award (2002)

- GlaxoSmithKline Chemistry Scholar Award (2002)
- Eli Lilly Grantee Award(2001)
- Camille Dreyfus Teacher-Scholar Award (2001)
- AstraZeneca 2000 Excellence in Chemistry Award
- Alfred P. Sloan Research Fellow (2000)
- NSF CAREER Award (2000-2004)
- Bristol-Myers Squibb Unrestricted Grant in Synthetic Organic Chemistry (2000-2003)
- TR100 Award-Voted one of the top100 innovators under 35 years of age by MIT's Technology Review Magazine (1999)
- Research Corporation Innovation Award (1997)
- Camille and Henry Dreyfus New Faculty Award (1997)
- Medical Foundation New Investigator Award (1997-1999)
- Roche Young Investigator Award (1997)
- National Institutes of Health Postdoctoral Fellowship (1995-1997)

PUBLICATIONS

Independent Publications (1997-2008)

32. Enantioselective Synthesis of the Central Ring System of Lomaiviticin A in the Form of an Unusually Stable Cyclic Hydrate. Krygowski, E.S.; Murphy-Benanato, K; Shair, M.D. *Angew. Chem. Int. Ed.*, **2008**, *47*, (online).

31. Stereoelectronic Effects Dictate Mechanistic Dichotomy between Cu(II)-Catalyzed and Enzyme-Catalyzed Reactions of Malonic Acid Half Thioesters. Fortner, K.C.; Shair, M.D. *J. Am. Chem. Soc.* **2007**, *129*, 1032-1033.

30. Syntheses of the Eastern Halves of Ritterazines B, F, G, and H, Leading to Reassignment of the 5,5-Spiroketal Stereochemistry of Ritterazines B and F. Phillips, S. T.; Shair, M. D. *J. Am. Chem. Soc.* **2007**, *129*, 6589-6598.

29. Synthesis of a 10,000-membered Library of Molecules Resembling Carpanone and Discovery of Vesicular Traffic Inhibitors. Goess, B.; Hannoush, R.; Chan, L.; Kirchhausen, T.; Shair, M. D. *J. Am. Chem. Soc.* **2006**, *128*, 5391-5403.

28. The Cdc42 Inhibitor Secramine B Prevents cAMP-Induced K(+) Conductance in Intestinal Epithelial Cells. Pelish, H.E.; Ciesla, W.; Tanaka, N.; Reddy, K.; Shair, M.D.; Kirchhausen, T.; Lencer, W. I. *Biochem Pharmacol.* **2006**, *71*, 1720-1726

27. Secramine Inhibits Cdc42-Dependent Functions in Cells and Cdc42 Activation *In Vitro* Pelish, H. E.; Peterson, J. R.; Salvareeza, S. B.; Rodriquez-Boulan, E.; Nazef, N.; Annis, D. A.; Chen, J.-L.; Stamnes, M.; Feng, Y.; Shair, M. D.; Kirchhausen, T. *Nature Chem. Biol.*

26. Catalytic Enantioselective Thioester Aldol Reactions That Are Compatible With Protic Functional Groups. Magdziak, D.; Lalic, G.; Lee, H. M.; Fortner, K. C.; Aloise, A. D.; Shair, M. D. *J. Am. Chem. Soc.* **2005**, *127*, 7284-7285.

25. Dynamic Kinetic Resolution During a Cascade Reaction on Substrates with Chrial All-Carbon Quaternary Centers. Xu, K.; Lalic, G.; Shair , M. D. *Angew Chem Int. Ed. Engl.* **2005**, *44*, 2259-2261.

24. Synthesis of (-)-longithorone A: Using Organic Synthesis to Probe a Proposed Biosynthesis. Morales, C. A.; Layton, M. E.; Shair, M. D. *Proc. Natl. Acad. Sci.* **2004**, *101*, 33, 12036-12041.

23. An Exceptionally Mild Catalytic Thioester Aldol Reaction Inspired by Polyketide Biosynthesis. Lalic, G; Aloise, A. D.; Shair, M. D. *J. Am. Chem. Soc.* **2003**, *125*, 2852-2853.

22. Biomimetic Synthesis of (-)-Longithorone A. Layton, M. E.; Morales, C. M.; Shair, M. D. *J. Am. Chem. Soc.* **2002**, *124*, 773-775.

21. Use of Biomimetic Diversity-Oriented Synthesis to Discover Galanthamine-Like Molecules with Biological Properties Beyond Those of the Natural Product. Pelish, H. E.; Westwood, N. J.; Feng, Y.; Kirchhausen, T.; Shair, M. D. *J. Am. Chem. Soc.* **2001**, *123*, 6740-6741.

20. Reaction Microarrays: A Method for Determining the Enantiomeric Excess of Thousands of Samples. Krobel, G.; Lalic, G.; Shair, M. D. *J. Am. Chem. Soc.* **2001**, *123*, 361-362. For commentaries, see: *Chem. & Eng. News* **2001**, *1/15*, 9. And *Chemistry&Industry* **2001**, *4*, 119. Selected as one of the Chemistry Highlights of 2001 by C&E News: *Chem. & Eng. News* **2001**, *12/10*, 51.

19. Synthesis of Cyclooctenones Using Intramolecular Hydroacylation. Aloise, A.; Layton, M. E.; Shair, M.D. *J. Am. Chem. Soc.* **2000**, *122,* 12610-12611.

18. Synthesis of (+)-CP-263,114. Chen, C.; Layton, M. E.; Sheehan, S. M.; Shair, M. D. *J. Am. Chem. Soc.* **2000**, *122*, 7424-7425.

17. A Highly Efficient and Convergent Reaction for the Synthesis of Bridgehead Enone-Containing Polycyclic Ring Systems. Sheehan, S. M.; Lalic, G.; Chen, J.; Shair, M. D. *Angew. Chem. Int. Ed. Engl.* **2000**, *39*, 2714-2715.

16. Solid-Phase Biomimetic Synthesis of Carpanone-Like Molecules. Lindsley, C; Chan, L.; Goess, B.; Joseph, R.; Shair, M. D. *J. Am. Chem. Soc.* **2000**, *122*, 422-423.

15. Stereospecific Synthesis of the CP-263,114 Core Structure. Chen, C.; Layton, M. E.; Shair, M. D. *J. Am. Chem. Soc.* **1998**, *120*, 10784-10785.

14. A Closer View of an Oncoprotein-Tumor Suppressor Interaction. Shair, M. D. *Chemistry and Biology*, **1997**, *4*, 791.

Undergraduate-Postdoctoral (1993-1999)

13. Synthesis and Preliminary Evaluation of a Library of Polycyclic Small Molecules for Use in Chemical Genetic Assays. Tan, D. S.; Foley, M. A.; Stockwell, B. R.; Shair, M. D.; Schreiber, S. L. *J. Am. Chem. Soc.* **1999**, *121*, 9073.

12. Stereoselective Synthesis of over Two Million Compounds Having Structural Features Both Reminiscent of Natural Products and Compatible with Miniaturized Cell-Based Assays. Tan, D. S.; Foley, M. A.; Shair, M. D.; Schreiber, S. L. *J. Am. Chem. Soc.* **1998**, *120*, 8565-8566.

11. Droplet Assay System. Shair, M. D.; Borchardt, A. J.; Schreiber, S. L. 60/029,128.

10. The Total Synthesis of Dynemicin A Leading to Development of a Fully Contained Bioreductively Activated Enediyne Prodrug. Shair, M. D., Yoon, T. Y., Mosny, K. K., Chou, D. and Danishefsky, S. J. *J. Am. Chem. Soc.* **1996**, *118*, 9509.

9. Observations in the Chemistry and Biology of Cyclic Enediyne Antibiotics: The Total Syntheses of Calicheamicin γ1I and Dynemicin A. Danishefsky, S. J. and Shair, M. D. *J. Org. Chem.* **1996**, *61*, 16.

8. Total Synthesis of (±)-Dynemicin A. Shair, M. D.; Yoon, T. Y. and Danishefsky, S. J. *Angew. Chem. Int. Ed. Engl.* **1995**, *34*, 1721.

7. DNA Cleaving Activities and Antitumor Effects of Synthetic Enediyne Derivatives. Chou, T. C.; Shair, M. D.; Yoon, T.; Zheng, Y. H.; Danishefsky, S. J. *Proc. Am. Assoc. Cancer Res.* **1995**, *36*: 384.

6. An Advanced Dynemicin A Model: Stabilization of the 3,8-Epoxide by Anthraquinone Functionality in the Absence of the Bridging Enediyne. Yoon, T.Y.; Shair, M. D.; and Danishefsky, S. J. *Tetrahedron Lett.* **1994**, *35*, 6259.

5. Novel Enediyne Quinone Imines and Methods of Preparation and Use Thereof. Shair, M. D.; Yoon, T. Y.; Chou, D.; Danishefsky, S. J. 08/347,952.

4. Enediyne Quinone Imines: Truncated, Biologically Active Dynemicin A Congeners. Shair, M. D.; Yoon, T.; Chou, D.; Danishefsky, S. J. *Angew. Chem. Int. Ed. Engl.* **1994**, *33*, 2477.

3. A Remarkable Cross Coupling Reaction to Construct the Enediyne Linkage Relevant to Dynemicin A: Synthesis of the Deprotected ABC System. Shair, M. D.; Yoon, T.Y.; and Danishefsky, S. J. *J. Org. Chem.* **1994**, *59*, 3755.

2. Experiments Directed Toward a Total Synthesis of Dynemicin A: A Solution to the Stereochemical Problem. Yoon, T.Y.; Shair, M. D.; Danishefsky, S. J.; and Schulte, G. K. *J. Org. Chem.* **1994**, *59*, 3752.

1. Synthetic and Mechanistic Studies of the Retro-Claisen Rearrangement. 2. A Facile Route to Medium-Ring Heterocycles via Rearrangement of Vinylcyclopropane- and Cyclobutanecarboxylates. Boeckman, R. K.; Shair, M. D.; Vargas, J. R.; and Stolz, L. A. *J. Org. Chem.* **1993**, *58*, 1295.

Invited Lectures

• Natural Products Gordon Research Conference, New Hampshire, 1998. ICCB Opening Symposium, Harvard Medical School, 1999. Merck, Rahway, New Jersey, 1999. Merck, KGAA, Darmstadt, Germany, 1999. Biogen, Cambridge, Massachusetts, 2000. Bristol-Myers Squibb, Princeton, New Jersey, 2000. Princeton University, New Jersey, 2000. New Jersey Regional ACS Meeting, 2000. Dupont, Wilmington, Delaware, 2000. Boston College, Massachusetts, 2000. St. Jude Cancer Forum, Memphis, Tennessee, 2000. Eli Lilly, Indianapolis, IN, 2000. Stereochemistry Gordon Research Conference, Rhode Island, 2000. Natural Products Gordon Research Conference, New Hampshire, 2000. NSF Synthesis Workshop, New Hampshire, 2000. Merck, West Point, Pennsylvania, 2000. Pfizer, Groton, Connecticut, 2000. Wyeth-Ayerst, Madison, New Jersey, 2000. Eisai Pharmaceuticals, 2000. Ohio State University, Columbus, 2000. UTSW at Dallas, Texas, 2000. University of Texas at Austin, 2000. University of North Carolina Chapel Hill, 2000. Astra-Zeneca Excellence in Chemistry Symposium, Wilmington, Delaware, 2000. University of Heidelberg, Germany, 2000. Colorado State University, Fort Collins, Colorado, 2000. Georgia Tech, Atlanta, Georgia, 2000. Emory University, Atlanta, Georgia, 2000. Pacifichem, Honolulu, Hawaii, 2000. Cotton Medal Symposium for Samuel Danishefsky, Texas A &M, College Station, 2001, Nichols Medal Symposium for Stuart Schreiber, White Plains, New York, 2001. ACS Synthesis Award Symposium for Eric Jacobsen, San Diego, California, 2001. University of Wisconsin-Madison, 2001. UC Irvine, 2001. Heterocycles Gordon Research Conference, New Hampshire, 2001. Combinatorial Chemistry Gordon Research Conference, New Hampshire, 2001. ACS National Conference, Chicago, Illinois, 2001. UC Berkeley, 2001. Yale University, New Haven, Connecticut, 2001. University of Chicago, Illinois, 2001. RSC-London, 2001. University of Colorado at Boulder, 2001. Celera, San Francisco, California, 2001. Scripps Frontiers in Synthesis Symposium, La Jolla, California, 2002. Eli-Lilly Grantee Symposium, Indianapolis, Indiana, 2002. Wayne State University, Detroit, Michigan, 2002. University of Alberta, Edmonton, Canada, 2002. BMS Symposium, Wallingford, Connecticut, 2002. McGill University, Montreal, Canada, 2002. University of Rochester, New York, 2002. European Symposium on Bioorganic Chemistry, Gregynog, Wales, 2002. RW Johnson, Springhouse, Pennsylvania, 2002. Philadelphia Organic Chemistry Club, Pennsylvania, 2002. Memorial Sloan-Kettering Cancer Center, New York, New York, 2002.

Bioorganic Chemistry Gordon Research Conference, New Hampshire, 2002. Bristol-Myers Squibb Symposium, University of Michigan, Ann Arbor, 2002. GlaxoSmithKline Chemistry Scholars Symposium, Chapel Hill, North Carolina, 2002. University of Illinois Urbana-Champaign Frontier Symposium, Illinois, 2002. Schering Plough Research Institute, Kenilworth, New Jersey, 2002. Ontario-Quebec Synthetic/Bio-organic Minisymposium, Queen's University, Kingston, Ontario, Canada, 2002. ETH Zurich, Switzerland, 2003. Brandeis University, Waltham, Massachusetts, 2003. University of Montreal, Canada, 2003. Columbia University, New York, 2003. AstraZeneca, Charnwood, UK, GlaxoSmithKline, Kent, UK, 2003, Pfizer, Kent, UK, Royal Society of Chemistry18th Intn'l Symposium on Synthesis in Organic Chemistry, Churchill College, Cambridge, UK, 2003, GlaxoSmithKline Chemistry Scholars Symposium, Research Triangle Park, NC, 2003, National Organic Symposium, Indiana University, Bloomington, 2003. 9th International Kyoto Conference on New Aspects of Organic Chemistry (IKCOC-9,) and Tohoku University, Kyoto, 4th International Forum on Chemistry of Functional Organic Chemicals (IFOC-4), Tokyo, Fujisawa Pharmaceutical Co., Ltd., Osaka, TITech, Tokyo, Japan, 2003. Euchem Conference, Burgenstock, Switzerland 2004, McGill University and Boehringer Ingelheim, 2004, University of Texas Southwestern Medical Center at Dallas, Paul Srere Memorial Lecturer, 2004. American Chemical Society 229th Spring National meeting, San Diego, CA , Earl Barnes Lecture, 2005, Northwestern University, Chicago, IL,2005, SUNY, Buffalo, NY, 2005, Oregon State University, Corvallis, OR and The University of Oregon, Eugene, OR, 2005, Novartis Chemistry Lectureship, Basel, Switzerland and Novartis Vienna, Austria, 2005, Novartis Pharmaceuticals Chemogenetics lecture , Cambridge, MA, 2005, Merck Research Laboratories Lecture, Boston, MA, 2005, Wyeth Symposium, Cambridge, MA, 2005, Banff Symposium on Organic Chemistry, Banff, BC, 2005. Memorial Sloan Kettering Cancer Center, New York, 2006, Danish Academy of Technical Sciences, ATV Symposium on "Organic Chemistry at the Interface to Biology", Copenhagen :The Knud Lind Larsen Symposium, 2006

Consulting:

Infinity Pharmaceuticals, Cambridge, MA, Founding Scientific Advisor (2001-present)
Enanta Pharmaceuticals, Watertown, MA, Scientific Advisor (1999-present)
Novartis Pharmaceuticals, Cambridge MA, Consultant (2005)
Bristol-Myers Squibb, New Brunswick, NJ, Scientific Advisor (2000-2002)