# CURRICULUM VITAE

**NAME** **LUCY SHAPIRO**

**HOME ADDRESS** 620 Sand Hill Rd, 328D
Palo Alto, CA 94304
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**PROFESSIONAL ADDRESS** Department of Developmental Biology
Stanford University School of Medicine
Stanford, CA 94305-5427
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**DEGREES**

1962 - A.B. Brooklyn College, cum laude
1966 - Ph.D. Molecular Biology, Albert Einstein College of Medicine

**APPOINTMENTS**

1962 - 1963 Graduate Student, predoctoral
NY University School of Medicine
Department of Microbiology

1963 - 1966 Graduate Student, predoctoral
Albert Einstein College of Medicine
Department of Molecular Biology

1966 - 1967 Postdoctoral Fellow
Albert Einstein College of Medicine
Department of Biochemistry

1967 - 1986 Faculty Member
Albert Einstein College of Medicine
Department of Molecular Biology
1967-1972 Assistant Professor
1972-1977 Associate Professor
1977-1986 Professor and Chairman
1981-1986 Director, Division of Biological Sciences

1986 - 1989 Professor and Chairman
College of Physicians & Surgeons,
Columbia University Department of Microbiology

1989 - Professor of Developmental Biology
Stanford University School of Medicine

1989 - 1997 Founding Chairman, Department of Developmental Biology

1990 - 1998 Professor of Genetics
Stanford University School of Medicine

1999 - Senior Fellow Freeman-Spogli Inst. for International Studies,
CISAC, Stanford University

2001 - Director, Beckman Center for Molecular
and Genetic Medicine, Stanford University

**HONORS:**
Sigma Xi, 1962
Jane Coffin Childs Fellow, 1966-1967
Faculty Research Associate Award, American Cancer Society, 1968-1971; 1971-1976
Albert and Jane Nerken Fellow in Molecular Biology, 1970-1976
Hirschl Career Scientist Award, 1976
Spirit of Achievement Award, 1978
Distinguished Alumna Award, Brooklyn College, 1983
Endowed Chair: Lola and Saul Kramer Professor of Molecular Biology, Albert Einstein College of Medicine, 1983-1986
Endowed Chair: Higgins Professor of Microbiology, Columbia University, 1986-1989
Endowed Chair: Joseph D. Grant Professor in the School of Medicine, Stanford University, 1989-1998
Fellow of the American Association for the Advancement of Science, 1988
Institute of Medicine of the National Academy of Sciences, 1991
American Academy of Arts and Sciences, 1992
NIH Merit Award, 1993-2003
American Academy of Microbiology, 1993
FASEB Excellence in Science Award, 1994
US National Academy of Science, 1994
Resident Scholar, Rockefeller Foundation, Bellagio, Italy, 1996
Endowed Chair: Ludwig Professor of Cancer Research in the School of Medicine, Stanford University 1998-
Fellow of the California Council on Science and Technology, 2002
American Philosophical Society, 2003
Selman A. Waksman Award, National Academy of Sciences, 2005
Hitchcock Professorship, UC Berkeley, 2008
Address the Swedish Royal Academy of Sciences, 2008
Canada Gairdner International Award, 2009
John Scott Award, 2009
Abbott Lifetime Achievement Award, ASM, 2010
Distinguished Alumna Award, Albert Einstein College of Medicine, 2010
US National Medal of Science, 2011
Dean’s Medal, Stanford University School of Medicine, 2012
Louisa Gross Horwitz Prize, 2012
ASCB Women in Cell Biology Lifetime Achievement Award, 2013
Pearl Meister Greengard Prize, Rockefeller University, 2014
Chan/Zuckerberg Investigator, 2017

**HONORARY LECTURES:**
Carnegie Mellon University, 1988
De Witt Stetten, Jr. Lecture, NIH, 1989
Woods Hole Arts and Sciences Lecture, 1989
Dean's Lecturer, University of Colorado, 1989
Dean's Lecture, University of Texas, Southwestern, 1990
Rockefeller University Lecture, 1991
Clayton S. White Lectureship, Oklahoma Medical Research Foundation, 1992
Harvey Society Lecture, 1992
Keynote Speaker at ASM Conference, University of Texas, 1992

Keynote Address, Massachusetts General Hospital Symposium, 1993
Keynote Speaker, Keystone Meeting on Microbial Development, 1993
ASBMB/ACS Plenary Lecture, 1993
Capital Science Lectures, Carnegie Institute, 1993
Runyon-Winchell Symposium, 1994
Commencement Address, U.C. Berkeley Biology, 1994
Keynote Address, American Academy of Arts and Sciences, Cal Tech., 1994
Krampitz Lecture, Case Western Reserve University, 1994
Commencement Address, U.C. Davis, 1995
Lamson Lecture, University of Tennessee, 1996
Sonneborne Lecture, Indiana University, 1996
J. P. Morgan, International Council, 1996
John M. Lewis Lecture, Rockefeller University, 1998
Honors Lecture, New York University School of Medicine, 1998
Sloan Kettering Institute 50th Anniversary Lecture, 1999
Distinguished Leaders in the Life Sciences Lecture, NAS, 1999
Marker Lectures, Penn State, 1999
Gothenberg Sweden, Inaguration of the Institute of Molecular Biology, 1999
Crawford Lecture, University of Iowa, 1999
Keynote Lecture, Albert Einstein College of Medicine Symposium, 1999
Oshman-Efron Lecture, Baylor College of Medicine, 2000
Director's Lecture at National Institutes of Health, Washington, DC, 2000
General Motors Cancer Research Foundation Lecture, Washington, DC, 2000
Adam Neville Lecture, University of Dundee, Scotland, 2001
Genome 2001 Lecture, Harvard University, 2001
International Conference on Systems Biology Lecture, Caltech, 2001
Jesup Lectures, Columbia University, 2002
DeWitt Stetten, Jr. Lecture, NIH, NIGMS 40th Anniversary, 2002
ICSB Lecture, Stockholm, 2002
Dolman Award Lecture, University of British Columbia, Vancouver, 2003
Systems Biology Institute Symposium Lecture, Seattle, 2003
Hopwood Lecture, John Innes Institute, UK, 2003
Stanier Lecture, UC Berkeley, 2003
UCSD Distinguished Lecture, San Diego, 2004
Krampitz Lecture, Case Univ., 2005
Ambrosetti Conference Speaker, Villa D'Este, Italy, 2005
Honors Lecture, NYU School of Medicine, 2006
Billingham Lecture, University Texas South Western Medical Center, 2006
Parker Lecture, College of Physicians & Surgeons, Columbia University, 2006
Keynote Address, Keystone meeting on Systems Biology, 2007
Frontiers in Science Lecture, University of Utah, 2007
Porter Lecture, American Society of Cell Biology, 2007
McGinnis Lecture, Duke University, 2008
ASM Keynote Address, Boston, 2008
Siminovitch Lecture, Toronto, 2008
UCSF Distinguished Lecture, 2009
Hitchcock Lectures, UC Berkeley, 2009
Nobel Symposium on Systems Biology, Stockholm, 2009
White Distinguished Lecture, University of Nevada, 2010
Pepe Lecture, University of Penn, 2010

Connell Lecture, Univ. of Michigan, 2010
Directors Colloquium, Livermore National Labs, 2010
EMBO Symposium, Vienna, 2011
Svedberg Lecture, Uppsala University, Sweden, 2012
Distinguished Lecture, Northwestern University, 2012
Jane Coffin Childs 50th Anniversary Symposium Lecture, 2012
Ochoa Lecture, NYU, 2012
Keynote: High Throughput Genomics and Epigenomics, CSH Asia, 2012
Robert P. Williams Lecture, Baylor College of Medicine, 2013
Keynote: Microbiology after the Genomics Revolution, Pasteur Inst. 2014
Keynote: EMBO Workshop, from Genes to Structure; α-proteobacteria, 2014
Kadner Distinguished Lecture in Microbiology, U of Virginia, 2014
Doty Lecture, Harvard, 2015
Gavin Lecture, Brooklyn College. 2017
Keynote Lecture, Genetics Retreat, UC San Diego, 2017

**PROFESSIONAL ACTIVITIES:**

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CA

1993-1997 Lecturer, Officer Training Program
1996 Superintendents Lecture: Bioterrorism Defense

WHITE HOUSE ADVISOR

Bioterrorism Threat
1998- President Clinton and the Cabinet
2002- Tom Ridge and Condoleeza Rice

CONFERENCES

Chairman, Conference on Cell Differentiation and Communication, Asilomar, California, 1974
Chairman, Conference on Regulation of Bacterial Differentiation, Asilomar, California, 1979
Chairman, 1980 Gordon Research Conference on Biological Regulatory Mechanisms
Chairman of the Cold Spring Harbor Microbial Development Meeting, 1983

BOARDS AND CONSULTANTSHIPS

**Federal Advisory Boards**

NIH Board of Scientific Counselors, NIAMKKD 1980-1984
NIH General Medical Sciences Council, 1981
Advisory Board for NSF Biological and Behavior Sciences Directorate, 1982; 1983-1987
Co-Chairman of Advisory Board for NSF BBS Directorate, 1988-1989
Presidio Council for the National Park Service, 1991-1994
President's Council, University of California, National Lab Oversight 1993-1997
Lawrence Berkeley National Laboratory (LBNL) Senior Advisory Board, 2006-2011
Presidents National Medal of Science Committee, 2008-2010
LBNL Biosciences Expert Advisory Committee, 2012 – present

**Academic Advisory Boards**

Brandeis University Biology Visiting Committee, 1982
Tenure Committee, Department of Cellular and Devel. Biology, Harvard, 1985;1987
Harvard University Visiting Committee, 1987-1990

MIT/Whitehead Institute Board of Advisory Scientists, 1988-1993
Massachusetts General Hospital, Scientific Advisory Committee, 1989-1993
Scientific Advisory Committee of the MGH Cancer Center, 1994-1995
Scientific Advisory Board, Biozentrum, Basel, Switzerland, 1999- 2001
Advisory Board, Hutchinson Cancer Center, 1999-2001
Board of Scientific Advisors, the Biodesign Institute, ASU, 2006-2008
Scientific Advisory Board: Singapore Inst. Molecular and Cellular Biology, 2006-2008
Board of Scientific Advisors, the Pasteur Institute, Paris, 2009- present

**Non-profit Advisory Boards**

Searle Scholars Program Advisory Board, 1982-1985
Consultant for the Burroughs Wellcome Fund, 1983
American Heart Association National Board, 1984-1987
Scientific Advisory Board, Helen Hay Whitney Foundation, 1989-1994
Howard Hughes Medical Institute, Science Review Board, 1990-1994
Grants Advisory Council of the Beckman Foundation, 1999-2009
Ludwig Institute Scientific Advisory Committee, 2000-present
Albert Lasker Medical Awards Selection Committee, 2010- present

**Corporate Advisory Boards**

Biotechnology Consultant, G.D. Searle and Co., London, 1983; 1984
Board of Scientific Advisors, G.D. Searle & Co., 1984-1986
Board of Scientific Advisors, SmithKline Beecham Pharmaceuticals, 1993-2000
Chairman, Genomic Advisory Board, SmithKline Beecham, 1994-1996
Board of Scientific Advisors, PathoGenesis, 1995-2000
Board of Scientific Advisors, GlaxoSmithKline, 2001-2007
Co-chair, Scientific Advisory Board of Anacor Pharmaceuticals, 2001-2016
Chair, Scientific Advisory Board, Boragen, Inc. 2017- present.

**Corporate Boards**

Board of Directors of Silicon Graphics, 1993-2000
Board of Directors of SmithKline Beecham, PLC, 1996-2000
Board of Directors of GlaxoSmithKline, 2001- 2006
Board of Directors and Founder of Anacor Pharmaceuticals, 2001- 2016
Board of Directors of Gen-Probe Inc., 2008 – 2012
Board of Directors of Pacific Biosciences, Inc, 2012 – present
Founder, Boragen, Inc, 2017 - present

**Scientific Society Committees**

Nominating Committee of the American Society of Biological Chemists, 1982; 1987
Board of Trustees, Scientist's Institute for Public Information, 1990-1994
Public Policy Committee of the American Society for Cell Biology, 1989-1991
Council of the American Society for Biochemistry and Molecular Biology,1990-1993

**Stanford University Advisory Committees**

Trustee Committee on Academic Policy, Stanford University, 1997-1999
Chair, Provostial Search Committee, Stanford University, 1999
President Search Committee, Stanford University, 1999-2000
Chair, Provostial Search Committee, Stanford University, 2000
Executive Committee, Center for Intl. Security and Cooperation, Stanford, 2001- present

PROFESSIONAL SOCIETIES

American Society for Biochemistry and Molecular Biology, 1970-present
Harvey Society, 1971-1990
American Society for Microbiology, 1973-present
New York Academy of Sciences, 1976-1990
Genetics Society, 1985-2006
American Society of Cell Biology, 1989-present

STUDY SECTIONS AND EDITORIAL BOARDS

NIH Study Section on Cell and Molecular Biology, 1975
NSF Study Section on Developmental Biology, 1976-1977
NIH Microbial Chemistry Study Section, 1978-1980
Editorial Board, Journal of Bacteriology, 1978-1986
Editorial Board, Genes and Development, 1987-1990
Editorial Board, Trends in Genetics; DNA, Differentiation
and Development (Elsevier publications, Cambridge) 1987-1996
Editorial Board, Cell Regulation (ASCB) 1989-1992
Section Editor, Current Opinion in Genetics and Development, 1990-1991; 1992-1993
Editorial Board, Molecular Microbiology, 1991-1995
Associate Editor, Molecular Biology of the Cell (An ASCB Journal), 1992-1998

**PATENTS**

- Stanford Docket S94-033, "Simulation Tool for Cellular Regulatory Networks". US Patent No. 5,914,891. Issued June 22, 1999, to H. McAdams, A. Arkin and L. Shapiro.
- Stanford/Penn State University, "DNA Adenine Methyltransferases and Uses Thereof". Issued July 9, 2002, to S. Benkovic, A. Berdis. L. Shapiro, R. Wright, C. Stephens, and L. Kahng.
- Penn State University/Stanford University "Adenine DNA Methyltransferase Inhibitors". PSU Invention Disclosure No. 99-2118, 2002 --- Pending.
- DOE / Lawerence Berkeley National Labs “Heavy Metal Biosensor”. U.S. Patent: Issued April 15, 2014, Patent #8,697,388.
- Stanford University/Univ Tokyo “MreB, a novel target to inhibit bacterial cell growth” US patent # S05-024, issued 2010.

**BIBLIOGRAPHY**

1. August, J.T., Shapiro, L., Cooper, S. & Zinder, N.D. (1963) RNA phage-induced polymerase. Cold Spring Harbor Symp. Quant. Biol. 28, 95
2. August, J.T., Shapiro, L. & Eoyang, L. (1965) Replication of RNA-viruses I. Characterization of a viral RNA-dependent RNA polymerase. J. Mol. Biol. 11, 257.
3. Shapiro, L. & August, J.T. (1965) Replication of RNA-viruses II. The RNA product of a reaction catalyzed by a viral RNA-dependent RNA polymerase. J. Mol. Biol. 11, 272
4. Shapiro, L. & August, J.T. (1965) Replication of RNA-viruses III. Utilization of ribonucleotide analogues in the reaction catalyzed by an RNA virus RNA polymerase. J. Mol. Biol. 14, 214.

5. Shapiro, L. (1966) Replication of bacteriophage RNA. Ph.D. Thesis, Albert Einstein College of Medicine.

6. Shapiro, L. & August, J.T. (1966) Ribonucleic acid virus replication. Bacteriol. Rev. 30, 279.

7. August, J.T. & Shapiro, L. (1967) RNA virus replication. Association for Research in Nervous and Mental Disease Res. Pub. 45.

8. Bellamy, A.R., Shapiro, L., August, J.T. & Joklik, W.K. (1967) Studies on the physical properties of reovirus type III. J. Mol. Biol. 29, 1.

9. Shapiro, L., Grossman, L.I., Marmur, J. & Kleinschmidt, A.L. (1968) Physical studies on the structure of yeast mitochondrial DNA. J. Mol. Biol. 33, 907.

10. Shapiro, L., Franze de Fernandez, M.T. & August, J.T. (1968) Resolution of two factors required in the Qβ RNA polymerase reaction. Nature 220, 478.

11. August, J.T., Banerjee, A.K., Eoyang, L., Franze de Fernandez, M.T., Hori, K., Kuo, C.H., Rensing, U. & Shapiro, L. (1968) Synthesis of bacteriophage Q□ RNA. Cold Spring Harbor Symp. Quant. Biol. 33, 73.

12. August, J.T., Eoyang, L., Franze de Fernandez, M.T., Hasegawa, S., Kuo, C.H., Rensing, U. & Shapiro, L. (1969) Replication of the RNA genome. J. Cell Physiol. 74, 187.

13. August, J.T., Eoyang, L., Rensing, U., Franze de Fernandez, M.T., & Shapiro, L. (1970) Phage-specific and host proteins in the replication of bacteriophage RNA. Fed. Proc. 29, 1170.

14. Agabian-Keshishian, N. & Shapiro, L. (1970) Stalked bacteria: Properties of DNA bacteriophage □CbK. J. Virol. 6, 847.

15. Shapiro, L. & Agabian-Keshishian, N. (1970) A specific assay for differentiation in the stalked bacterium *Caulobacter crescentus.* Proc. Natl. Acad. Sci., USA 67, 200.

16. Bendis, I.K., & Shapiro, L. (1970) Studies with stalked bacteria: Properties of RNA bacteriophage ØCb5 J. Virol. 6, 847.

17. Agabian-Keshishian, N. & Shapiro, L. (1971) Bacterial differentiation and phage infection. Virology 44, 46.

18. Shapiro, L., Agabian-Keshishian, N. & Bendis, I. (1971) Bacterial differentiation. Science 173, 884.

19. Shapiro, L., Agabian-Keshishian, N., Hirsch, A. & Rosen, O.M. (1972) Effect of dibutyryl cyclic AMP on growth and development in *Caulobacter*. Proc. Natl. Acad. Sci., USA 69, 1225.

20. Leonard, K., Agabian-Keshishian, N., Maizel, J., Shapiro, L. & Kleinschmidt, A.K. (1972) The head morphology of bacteriophage □CbK. J. Mol. Biol. 71, 201.

21. Agabian, N., Rosen, O.M. & Shapiro, L. (1972) Characterization of a protein acyl kinase from *Caulobacter crescentus*. Biochem. Biophys. Res. Commun. 49, 1690.

22. Shapiro, L. & Maizel, J. (1973) The synthesis and structure of flagella in *Caulobacter crescentus*. J. Bacteriol. 113, 478.

23. Bendis, I.K. & Shapiro, L. (1973) RNA-dependent RNA polymerase of *Caulobacter crescentus*. J. Bacteriol. 115, 848.

24. Kurn, N., Ammer, S. & Shapiro, L. (1974) A pleiotropic mutation affecting expression of polar development events in *Caulobacter crescentus*. Proc. Natl. Acad. Sci., USA 71, 3157.

25. Sun, I.C., Shapiro, L. & Rosen, O.M. (1974) Purification and characterization of guanylate cyclase from *Caulobacter crescentus*. Biochem. Biophys. Res. Commun. 61, 193.

26. Wood, N., Shapiro, L. (1975) Morphogenesis in *Caulobacter crescentus.* In "Cell Differentiation" (H. Holzer and J. Reinart, eds.), p. 133, Springer-Verlag, Berlin.

27. Kurn, N. & Shapiro, L. (1975) Regulation of the *Caulobacter* cell cycle. In "Current Topics in Cellular Regulation" (B.L. Horecke & E.R. Stadtman, eds.), Vol. 9, p. 41, Academic Press, New York.

28. Bendis, I.K. & Shapiro, L. (1975) RNA phages of bacteria other than E. coli. In "RNA Phage" (N. Zinder, ed.), Cold Spring Harbor Laboratory Press.

29. Sun, I.C., Shapiro, L. & Rosen, O.M. (1975) Characterization of two cyclic nucleotide-binding proteins from *Caulobacter crescentus*. J. Biol. Chem. 250, 6181.

30. Wood, N., Rake, A. & Shapiro, L. (1976) Structure of *Caulobacter* DNA. J. Bacteriol. 126, 1305.

31. Shapiro, L., and Dworkin, M. (1975) editors, "Cell Differentiation and Communication", American Society of Microbiology, Washington, D.C.

32. Shapiro, L. (1976) Differentiation in the *Caulobacter* cell cycle. Ann. Rev. Microbiol. 30, 377.

33. Kurn, N. & Shapiro, L. (1976) Cyclic GMP as a repressor of proteins used for surface structure formation. Proc. Natl. Acad. Sci., USA 73, 3003.

34. Kurn, N. & Shapiro, L. (1976) Cyclic nucleotides and the *Caulobacter* cell cycle. In "Cyclic Nucleotides and the Regulation of Cell Growth" (M. Abou-Sabe, ed.) Dowden, Hutchinson & Ross, Inc., p. 37.

35. Marino, W., Ammer, S. & Shapiro, L. (1976) Conditional surface structure mutants of *Caulobacter crescentus*: Temperature-sensitive flagella formation due to altered flagellin monomer. J. Mol. Biol. 107, 115.

36. Skalka, A. & Shapiro, L. (1976) *In situ* assays for gene translation products in phage plaques and bacterial colonies. Gene 1, 65.

37. Amemiya, K., Wu, C.W. & Shapiro, L. (1977) *Caulobacter crescentus* RNA polymerase: Purification and characterization of holoenzyme and core polymerase. J. Biol. Chem. 252, 4157.

38. Skalka, A., & Shapiro L. (1977) Screening for recombinant DNAs with *in situ* immunoassays. ICN-UCLA Symposium on Molecular and Cell Biology. In Eukaryotic Genetic Systems, Vol., VIII (Wilcox, Abelson and Fox, eds.), p. 75.

39. Kurn, N., Shapiro, L. & Agabian, N. (1977) Effect of carbon source utilization on the *Caulobacter* cell cycle and the role of cyclic AMP. J. Bacteriol. 131, 951.

40. Colb, M. & Shapiro, L. (1977) pH-Conditional mutants of *E. coli*. Proc. Natl. Acad. Sci., USA 74, 5637.

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42. Kurn, N., Colb, M. & Shapiro, L. (1978) Spontaneous frequency of a developmental mutant in *Volvox*. Dev. Biol. 66, 266.

43. Bender, R.A., Agabian, N. & Shapiro, L. (1978) Cell differentiation in *Caulobacter crescentus*. In "The Molecular Genetics of Development" (T. Leighton, ed.), Academic Press, Inc., N.Y.

44. Contreras, I., Shapiro, L. & Henry, S. (1978) Phospholipid composition of *Caulobacter crescentus*. J. Bacteriol. 135, 1130.

45. Johnson, R., Walsh, J.P., Ely, B. & Shapiro, L. (1979) Flagella hook and basal body complex of *Caulobacter crescentus*. J. Bacteriol. 138, 984.

46. Anderson, D.M., Skalka, A. & Shapiro, L. (1979) *In situ* imunoassays for translation products. Methods in Enzymol. 68, 428.

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50. Contreras, I., Bender, R., Weissborn, A., Amemiya, K., Mansour, J., Henry, S. & Shapiro, L. (1979) The effect of membrane phospholipid synthesis on cell cycle-dependent events in *Caulobacter*. J. Mol. Biol. 138, 401.

51. Nisen, P. & Shapiro, L. (1979) *E. coli* ribosomal RNA contains sequences homologous to insertion sequences IS1 and IS2. Nature 282, 872.

52. Mansour, J., Henry, S. & Shapiro, L. (1980) Differential membrane phospholipid synthesis during the cell cycle of *Caulobacter crescentus*. J. Bacteriol. 141, 262.

53. Raboy, B., Shapiro, L. & Amemiya, K. (1980) Physical map of *Caulobacter crescentus* bacteriophage □Cd1 DNA. J. Virol. 34, 542.

54. Amemiya, K., Raboy, B. & Shapiro, L. (1980) Involvement of the host RNA polymerase in the early transcription program of the *Caulobacter crescentus* bacteriophage □Cd1. Virology 104, 109.

55. Nisen, P. & Shapiro, L. (1980) Inverted repeat nucleotide sequences in *E. coli* and *C. crescentus*. In "Transposable Genetic Elements". Cold Spring Harbor Symposium.

56. Mansour, J.D., Henry, S. & Shapiro, L. (1981) Phospholipid biosynthesis is required for stalk formation in *Caulobacter crescentus*. J. Bacteriol. 145, 1404.

57. Shapiro, L., Nisen, P. & Ely, B. (1981) Genetic analysis of the differentiating bacterium *Caulobacter crescentus*. In "Genetics as a Tool in Microbiology" (S. Glover, ed.), 31st Symposium, Society of General Microbiology, England.

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62. Amemiya, K. & Shapiro, L. (1982) *In vitro* transcription of the early region of phase Cd1 DNA by the *Caulobacter crescentus* RNA polymerase. Biochemistry 21, 4707.

63. Purucker, M., Bryan, R., Amemiya, K., Ely, B. & Shapiro, L. (1982) Isolation of a *Caulobacter* gene cluster specifying flagellum production using non-motile Tn5 insertion mutants. Proc. Natl. Acad. Sci., USA 79, 6797.

64. Bellofatto, V., Amemiya, K. & Shapiro, L. (1983) Purification and characterization of an RNA processing enzyme from *Caulobacter crescentus*. J. Biol. Chem. 258, 5467.

65. Shapiro, L. (1983) Regulation of temporal and spatial differentiation in *Caulobacter crescentus*. In "Microbiology-1983" (D. Schlessinger, ed.), ASM Press, p. 178.

66. Amemiya, K. & Shapiro, L. (1983) Differential template recognition by the *C. crescentus* RNA polymerase. J. Biol. Chem. 258, 8984.

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68. Bellofatto, V., Shapiro, L. & Hodgson, D. (1984) Generation of a Tn5 promoter probe and its use in the study of gene expression in *Caulobacter crescentus*. Proc. Natl. Acad. Sci., USA 81, 1035.

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71. Hodgson, D., Shaw, P., Letts, V., Henry, S. & Shapiro, L. (1984) Genetic analysis and characterization of a mutant of *Caulobacter crescentus* defective in membrane biogenesis. J. Bacteriol. 158, 430.

72. Ely, B. & Shapiro, L. (1984) Regulation of cell differentiation in *Caulobacter crescentus.* In Microbial Development (Losick, R. & Shapiro, L., eds.), Cold Spring Harbor Laboratory Press.

73. Gomes, S.L., & Shaprio, L. (1984) Differential expression and position of chemotaxis methylation proteins in *Caulobacter*. J. Mol. Biol. 178, 551.

74. Hodgson, D., Shaw, P. & Shapiro, L. (1984) Isolation and genetic analysis of *Caulobacter* mutants defective in cell shape and lipid synthesis. Genetics, 108, 809.

75. Shapiro, L. (1985) Generation of polarity during *Caulobacter* differentiation. Ann. Rev. Cell Biol. 1, 225.

76. Shapiro, L., Alexander, W., Bryan, R., Champer, R., Frederikse, P., Gomes, S.L., Hahnenberger, K., & Ely, B. (1985) Biogenesis of a polar flagellum and a chemosensory system during *Caulobacter* cell differentiation. In Sensing and Response in Microorganisms (Eisenbach, M., & Balaban, M., eds.) Elsevier Science Publishers, U.K., p. 93.

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80. Shapiro, L. (1985) Cell differentiation in *Caulobacter*. In Trends in Genetics. Vol. 1, 12, 317.

81. Amemiya, K., Bellofatto, V., Shapiro, L. & Feingold, J. (1986) Transcription initiation *in vitro* and *in vivo* at a highly conserved promoter within a 16S ribosomal RNA gene. J. Mol. Biol. 187, 1.

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83. Nathan, P., Gomes, S.L., Hahnenberger, K., Newton, A. & Shapiro, L. (1986) Differential localization of methyl-accepting chemotaxis proteins in the *Caulobacter* predivisional cell. J. Mol. Biol. 191, 433.

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Current positions of postdocs trained in the Shapiro Lab now running independent *Caulobacter* laboratories

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Yves Brun, University Indiana
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Urs Jenal, Biozentrum, Basel (Switzerland)
Christine Jacobs-Wagner, Yale University
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Associate Professors:

Ken Keiler, Penn State University
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Assistant Professors:

Justine Collier, University Lausanne, (Switzerland)
Erin Goley, Johns Hopkins University
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Jimmy Blair, Williams College, Massachusetts
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