



## Lucy Shapiro

Virginia and D. K. Ludwig Professor, Emerita  
Developmental Biology

 Curriculum Vitae available Online

### CONTACT INFORMATION

#### • Alternate Contact

Ngan Tefera - Administrative Support

**Email** ntefera@stanford.edu

**Tel** (650) 498-7301

### Bio

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#### ACADEMIC APPOINTMENTS

- Professor Emeritus, Developmental Biology
- Member, Bio-X
- Faculty Fellow, Sarafan ChEM-H

#### ADMINISTRATIVE APPOINTMENTS

- Director, Beckman Center for Molecular & Genetic Medicine, (2004- present)

#### HONORS AND AWARDS

- Dickson Prize in Science, Carnegie Mellon University (2020)
- Chan/Zuckerberg Investigator, Chan/Zuckerberg Biohub (2017)
- ASCB Women in Cell Biology Lifetime Achievement Award, American Society for Cell Biology (2013)
- Pearl Meister Greengard Prize, Rockefeller University (2013)
- Dean's Medal, Stanford University School of Medicine (2012)
- Louisa Gross Horwitz Prize, Columbia University Medical Center (2012)
- National Medal of Science, National Science Foundation (2011)
- Abbott Lifetime Achievement Award, ASM (2010)
- Distinguished Alumna Award, Albert Einstein College of Medicine (2010)
- Canada Gairdner International Award, Gairdner Foundation (2009)
- John Scott Award, Philadelphia City Trust (2009)
- Address the Swedish Royal Academy of Sciences, Swedish (2008)
- Hitchcock Professorship, UC Berkeley (2008)
- Selman A. Waksman Award, National Academy of Sciences (2005)
- Elected to the American Philosophical Society, American Philosophical Society (2003)

- FASEB Excellence in Science Award, Federation of American Societies for Experimental Biology (1994)
- National Academy of Sciences, National Academy of Sciences (1994)
- American Academy of Microbiology, American Academy of Microbiology (1993)
- American Academy of Arts and Sciences, American Academy of Arts and Sciences (1992)
- Institute of Medicine of the National Academy of Sciences, National Academy of Sciences (1991)

## PROFESSIONAL EDUCATION

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

## LINKS

- CAP Profile: <http://med.stanford.edu/profiles/devbio/frdActionServlet?choiceId=facProfile&fid=4316>
- <http://shapirolab.stanford.edu>: <http://shapirolab.stanford.edu>

## Research & Scholarship

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### CURRENT RESEARCH AND SCHOLARLY INTERESTS

A basic question in developmental biology involves the mechanisms used to generate the three-dimensional organization of a cell from a one-dimensional genetic code. Our goal is to define these mechanisms using both molecular genetics and biochemistry. The developmental program by which a single cell proceeds to a fully-developed organism involves cell divisions that yield dissimilar daughter cells. The characteristics that differentiate one daughter cell from the other result from differential transcription and subcellular positioning of regulatory and structural proteins. How this is brought about remains one of the most fundamental questions of developmental biology. To approach this question, we are studying a bacterial cell, whose simple life cycle is focused on the generation of asymmetry in the predivisive cell.

We are using full genome sequence and microarray technology to identify the genetic circuitry that controls the cell cycle in a bacterial cell with 3767 genes. Dynamic protein localization, phosphorelay signaling cascades, and spatially and temporally controlled proteolysis are overlaid on the transcription network that controls cell cycle progression and cell differentiation.

## Teaching

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### STANFORD ADVISEES

#### Doctoral Dissertation Reader (AC)

Gabriel Amador, Meghan Nolan

### GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Cancer Biology (Phd Program)
- Developmental Biology (Phd Program)
- Molecular and Genetic Medicine (Fellowship Program)

## Publications

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### PUBLICATIONS

- **Identification and Demonstration of roGFP2 as an Environmental Sensor for Cryogenic Correlative Light and Electron Microscopy.** *Journal of structural biology*  
Perez, D., Dahlberg, P. D., Wang, J., Sartor, A. M., Borden, J. S., Shapiro, L., Moerner, W. E.

2022: 107881

- **ATP-responsive biomolecular condensates tune bacterial kinase signaling.** *Science advances*  
Saurabh, S., Chong, T. N., Bayas, C., Dahlberg, P. D., Cartwright, H. N., Moerner, W. E., Shapiro, L.  
2022; 8 (7): eabm6570
- **Delivering the message: How a novel technology enabled the rapid development of effective vaccines.** *Cell*  
Shapiro, L., Losick, R.  
2021
- **A localized adaptor protein performs distinct functions at the Caulobacter cell poles.** *Proceedings of the National Academy of Sciences of the United States of America*  
Wang, J., Moerner, W. E., Shapiro, L.  
2021; 118 (13)
- **A localized adaptor protein performs distinct functions at the Caulobacter cell poles** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Wang, J., Moerner, W. E., Shapiro, L.  
2021; 118 (13)
- **A Bacterial Toxin Perturbs Intracellular Amino Acid Balance To Induce Persistence.** *mBio*  
Zhou, X., Eckart, M. R., Shapiro, L.  
2021; 12 (1)
- **A Bacterial Toxin Perturbs Intracellular Amino Acid Balance To Induce Persistence** *MBIO*  
Zhou, X., Eckart, M. R., Shapiro, L.  
2021; 12 (1)
- **The Nucleoid-Associated Protein GapR Uses Conserved Structural Elements To Oligomerize and Bind DNA.** *mBio*  
Lourenco, R. F., Saurabh, S., Herrmann, J., Wakatsuki, S., Shapiro, L.  
2020; 11 (3)
- **Cryogenic single-molecule fluorescence annotations for electron tomography reveal in situ organization of key proteins in Caulobacter.** *Proceedings of the National Academy of Sciences of the United States of America*  
Dahlberg, P. D., Saurabh, S., Sartor, A. M., Wang, J., Mitchell, P. G., Chiu, W., Shapiro, L., Moerner, W. E.  
2020
- **Cryogenic Superresolution Fluorescence Correlated with Cryogenic Electron Tomography: Combining Specific Labeling and High Resolution**  
Dahlberg, P. D., Saurabh, S., Wang, J., Sartor, A. M., Chiu, W., Shapiro, L., Moerner, W. E.  
CELL PRESS.2020: 20A–21A
- **Continuous, Topologically Guided Protein Crystallization Drives Self-Assembly of a Bacterial Surface Layer**  
Comerci, C. J., Herrmann, J., Yoon, J., Jabbarpour, F., Zhou, X., Nomellini, J. F., Smit, J., Shapiro, L., Wakatsuki, S., Moerner, W. E.  
CELL PRESS.2020: 201A–202A
- **Robust Modulation of a Bacterial Kinase by Protein Phase Separation**  
Saurabh, S., Chong, T., Bayas, C., Dahlberg, P. D., Moerner, W. E., Shapiro, L.  
CELL PRESS.2020: 203A
- **Selective sequestration of signalling proteins in a membraneless organelle reinforces the spatial regulation of asymmetry in Caulobacter crescentus.** *Nature microbiology*  
Lasker, K., von Diezmann, L., Zhou, X., Ahrens, D. G., Mann, T. H., Moerner, W. E., Shapiro, L.  
2020
- **Cryogenic single-molecule active control microscopy with a photoactivatable fluorescent protein**  
Sartor, A. M., Dahlberg, P. D., Wang, J., Saurabh, S., Shapiro, L., Moerner, W. E., Gregor, Koberling, F., Erdmann, R.  
SPIE-INT SOC OPTICAL ENGINEERING.2020
- **A bacterial surface layer protein exploits multistep crystallization for rapid self-assembly.** *Proceedings of the National Academy of Sciences of the United States of America*

- Herrmann, J., Li, P., Jabbarpour, F., Chan, A. C., Rajkovic, I., Matsui, T., Shapiro, L., Smit, J., Weiss, T. M., Murphy, M. E., Wakatsuki, S.  
2019
- **Asymmetric division yields progeny cells with distinct modes of regulating cell cycle-dependent chromosome methylation.** *Proceedings of the National Academy of Sciences of the United States of America*  
Zhou, X., Wang, J., Herrmann, J., Moerner, W. E., Shapiro, L.  
2019
  - **Protein Self-Assembly Drives Surface Layer Biogenesis and Maintenance in *C. crescentus***  
Herrmann, J., Comerci, C., Yoon, J., Jabbarpour, F., Shapiro, L., Wakatsuki, S., Moerner, W. E.  
CELL PRESS.2019: 159A
  - **Biomolecular Condensates at Bacterial Cell Poles Function to Drive Spatially Restricted Signal Propagation**  
Shapiro, L.  
CELL PRESS.2019: 5A
  - **A Bacterial Biomolecular Condensate Sequesters a Signaling Pathway that Drives Spatial Regulation of Gene Expression and Asymmetric Cell Division**  
Lasker, K., von Diezmann, A., Moerner, W. E., Shapiro, L.  
CELL PRESS.2019: 453A
  - **Multi-Step 2D Protein Crystallization via Structural Changes within an Ordered Lattice**  
Herrmann, J., Comerci, C. J., Jabbarpour, F., Shapiro, L., Moerner, W. E., Wakatsuki, S.  
CELL PRESS.2019: 194A
  - **Dissection of Protein Function Within a Bacterial Biomolecular Condensate by In Vitro Reconstitution**  
Saurabh, S., Shapiro, L.  
CELL PRESS.2019: 458A–459A
  - **Topologically-guided continuous protein crystallization controls bacterial surface layer self-assembly.** *Nature communications*  
Comerci, C. J., Herrmann, J. n., Yoon, J. n., Jabbarpour, F. n., Zhou, X. n., Nomellini, J. F., Smit, J. n., Shapiro, L. n., Wakatsuki, S. n., Moerner, W. E.  
2019; 10 (1): 2731
  - **Identification of PAMKate as a Red Photoactivatable Fluorescent Protein for Cryogenic Super-Resolution Imaging.** *Journal of the American Chemical Society*  
Dahlberg, P. D., Sartor, A. M., Wang, J., Saurabh, S., Shapiro, L., Moerner, W. E.  
2018; 140 (39): 12310–13
  - **Integration of cell cycle signals by multi-PAS domain kinases.** *Proceedings of the National Academy of Sciences of the United States of America*  
Mann, T. H., Shapiro, L.  
2018
  - **Spatial organization and dynamics of RNase E and ribosomes in *Caulobacter crescentus*** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Bayas, C. A., Wang, J., Lee, M. K., Schrader, J. M., Shapiro, L., Moerner, W. E.  
2018; 115 (16): E3712–E3721
  - **A Polar Matrix Microdomain Constrains Diffusion and Regulates Intracellular Signaling**  
von Diezmann, A., Lasker, K., Mann, T. H., Ahrens, D. G., Shapiro, L., Moerner, W. E.  
CELL PRESS.2018: 548A
  - **Probing Asymmetric Behavior of a Cell Cycle Regulatory Protein in Live *Caulobacter* using Single-Molecule Imaging**  
Wang, J., Shapiro, L., Moerner, W. E.  
CELL PRESS.2018: 350A
  - **A Red Fluorescent Protein for Cryogenic Single-Molecule Superresolution Imaging**  
Sorter, A. M., Dahlberg, P. D., Wang, J., Shapiro, L., Moerner, W. E.  
CELL PRESS.2018: 529A–530A
  - **Environmental Calcium Controls Alternate Physical States of the *Caulobacter* Surface Layer**

- Herrmann, J., Smit, J., Shapiro, L., Wakatsuki, S.  
CELL PRESS.2018: 404A
- **Two-Color Sted Microscopy to Visualize S-Layer Biogenesis in Caulobacter Crescentus**  
Comerci, C. J., Herrmann, J., Shapiro, L., Wakatsuki, S., Moerner, W. E.  
CELL PRESS.2018: 613A
  - **Spatial Organization and Dynamics of RNA Processing in Caulobacter Crescentus**  
Bayas, C., Wang, J., Lee, M. K., Schrader, J. M., Shapiro, L., Moerner, W. E.  
CELL PRESS.2018: 251A
  - **Environmental Calcium Controls Alternate Physical States of the Caulobacter Surface Layer** *BIOPHYSICAL JOURNAL*  
Herrmann, J., Jabbarpour, F., Bargar, P. G., Nomellini, J. F., Li, P., Lane, T. J., Weiss, T. M., Smit, J., Shapiro, L., Wakatsuki, S.  
2017; 112 (9): 1841-1851
  - **Ultra-photostable, genetically directed fluoromodule enables STED nanoscopy and long time scale single protein tracks in live bacteria**  
Saurabh, S., Perez, A., Comerci, C., Shapiro, L., Moerner, W.  
AMER CHEMICAL SOC.2017
  - **A Localized Complex of Two Protein Oligomers Controls the Orientation of Cell Polarity.** *mBio*  
Perez, A. M., Mann, T. H., Lasker, K., Ahrens, D. G., Eckart, M. R., Shapiro, L.  
2017; 8 (1)
  - **Super-Resolution Microscopy and Single-Protein Tracking in Live Bacteria Using a Genetically Encoded, Photostable Fluoromodule.** *Current protocols in cell biology*  
Saurabh, S. n., Perez, A. M., Comerci, C. J., Shapiro, L. n., Moerner, W. E.  
2017; 75: 4.32.1–4.32.22
  - **Dynamic translation regulation in Caulobacter cell cycle control.** *Proceedings of the National Academy of Sciences of the United States of America*  
Schrader, J. M., Li, G., Childers, W. S., Perez, A. M., Weissman, J. S., Shapiro, L., McAdams, H. H.  
2016; 113 (44): E6859-E6867
  - **Cell cycle progression in Caulobacter requires a nucleoid-associated protein with high AT sequence recognition** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Ricci, D. P., Melfi, M. D., Lasker, K., Dill, D. L., McAdams, H. H., Shapiro, L.  
2016; 113 (40): E5952-E5961
  - **An intracellular compass spatially coordinates cell cycle modules in Caulobacter crescentus.** *Current opinion in microbiology*  
Lasker, K., Mann, T. H., Shapiro, L.  
2016; 33: 131-139
  - **Super-resolution Imaging of Live Bacteria Cells Using a Genetically Directed, Highly Photostable Fluoromodule.** *Journal of the American Chemical Society*  
Saurabh, S., Perez, A. M., Comerci, C. J., Shapiro, L., Moerner, W. E.  
2016; 138 (33): 10398-10401
  - **A cell cycle kinase with tandem sensory PAS domains integrates cell fate cues** *NATURE COMMUNICATIONS*  
Mann, T. H., Childers, W. S., Blair, J. A., Eckart, M. R., Shapiro, L.  
2016; 7
  - **Three-Dimensional Super-Resolution Imaging of the RNA Degradation Machinery in Caulobacter Crescentus**  
Bayas, C. A., Schrader, J. M., Lee, M. K., Shapiro, L., Moerner, W. E.  
CELL PRESS.2016: 163A–164A
  - **CauloBrowser: A systems biology resource for Caulobacter crescentus.** *Nucleic acids research*  
Lasker, K., Schrader, J. M., Men, Y., Marshik, T., Dill, D. L., McAdams, H. H., Shapiro, L.  
2016; 44 (D1): D640-5
  - **CauloBrowser: A systems biology resource for Caulobacter crescentus.** *Nucleic acids research*  
Lasker, K., Schrader, J. M., Men, Y., Marshik, T., Dill, D. L., McAdams, H. H., Shapiro, L.

2016; 44 (D1): D640-5

- **A cell cycle kinase with tandem sensory PAS domains integrates cell fate cues.** *Nature communications*  
Mann, T. H., Seth Childers, W., Blair, J. A., Eckart, M. R., Shapiro, L.  
2016; 7: 11454-?
- **Synchronization of *Caulobacter Crescentus* for Investigation of the Bacterial Cell Cycle** *JOVE-JOURNAL OF VISUALIZED EXPERIMENTS*  
Schrader, J. M., Shapiro, L.  
2015
- **The global regulatory architecture of transcription during the *Caulobacter* cell cycle.** *PLoS genetics*  
Zhou, B., Schrader, J. M., Kalogeraki, V. S., Abeliuk, E., Dinh, C. B., Pham, J. Q., Cui, Z. Z., Dill, D. L., McAdams, H. H., Shapiro, L.  
2015; 11 (1)
- **A pseudokinase couples signaling pathways to enable asymmetric cell division in a bacterium** *MICROBIAL CELL*  
Childers, W., Shapiro, L.  
2015; 2 (1): 29-32
- **The Global Regulatory Architecture of Transcription during the *Caulobacter* Cell Cycle.** *PLoS genetics*  
Zhou, B., Schrader, J. M., Kalogeraki, V. S., Abeliuk, E., Dinh, C. B., Pham, J. Q., Cui, Z. Z., Dill, D. L., McAdams, H. H., Shapiro, L.  
2015; 11 (1)
- **Replication initiator DnaA binds at the *Caulobacter* centromere and enables chromosome segregation** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Mera, P. E., Kalogeraki, V. S., Shapiro, L.  
2014; 111 (45): 16100-16105
- **Replication initiator DnaA binds at the *Caulobacter* centromere and enables chromosome segregation.** *Proceedings of the National Academy of Sciences of the United States of America*  
Mera, P. E., Kalogeraki, V. S., Shapiro, L.  
2014; 111 (45): 16100-5
- **Cell Fate Regulation Governed by a Repurposed Bacterial Histidine Kinase** *PLOS BIOLOGY*  
Childers, W. S., Xu, Q., Mann, T. H., Mathews, I. I., Blair, J. A., Deacon, A. M., Shapiro, L.  
2014; 12 (10)
- **Cell fate regulation governed by a repurposed bacterial histidine kinase.** *PLoS biology*  
Childers, W. S., Xu, Q., Mann, T. H., Mathews, I. I., Blair, J. A., Deacon, A. M., Shapiro, L.  
2014; 12 (10)
- **CipXP and CipAP proteolytic activity on divisome substrates is differentially regulated following the *Caulobacter* asymmetric cell division** *MOLECULAR MICROBIOLOGY*  
Williams, B., Bhat, N., Chien, P., Shapiro, L.  
2014; 93 (5): 853-866
- **The coding and noncoding architecture of the *Caulobacter crescentus* genome.** *PLoS genetics*  
Schrader, J. M., Zhou, B., Li, G., Lasker, K., Childers, W. S., Williams, B., Long, T., Crosson, S., McAdams, H. H., Weissman, J. S., Shapiro, L.  
2014; 10 (7)
- **The Coding and Noncoding Architecture of the *Caulobacter crescentus* Genome.** *PLoS genetics*  
Schrader, J. M., Zhou, B., Li, G., Lasker, K., Childers, W. S., Williams, B., Long, T., Crosson, S., McAdams, H. H., Weissman, J. S., Shapiro, L.  
2014; 10 (7)
- **Bacterial scaffold directs pole-specific centromere segregation.** *Proceedings of the National Academy of Sciences of the United States of America*  
Ptacin, J. L., Gahlmann, A., Bowman, G. R., Perez, A. M., von Diezmann, A. R., Eckart, M. R., Moerner, W. E., Shapiro, L.  
2014; 111 (19): E2046-55
- **The functions of DNA methylation by CcrM in *Caulobacter crescentus*: a global approach.** *Nucleic acids research*  
Gonzalez, D., Kozdon, J. B., McAdams, H. H., Shapiro, L., Collier, J.  
2014; 42 (6): 3720-3735

- **Systems architecture of a bacterial cell cycle**  
Shapiro, L.  
FEDERATION AMER SOC EXP BIOL.2014
- **Ribosome Profiling of the Caulobacter Cell-Cycle** *58th Annual Meeting of the Biophysical-Society*  
Schrader, J. M., Li, G., Zhou, B., Weissman, J. S., Shapiro, L.  
CELL PRESS.2014: 375A–376A
- **Quantifying the Spatial Organization of Bacterial Ribosomes using Three-Dimensional Super-Resolution Microscopy**  
Lee, M., Schrader, J., Li, G., Weissman, J., McAdams, H., Shapiro, L., Moerner, W. E.  
CELL PRESS.2014: 492A
- **DNA Segregation and Partitioning in Caulobacter Crescentus: Super-Resolving Protein Colocalization at the Cell Pole**  
Gahlmann, A., Ptacin, J. L., von Diezmann, A. S., Shapiro, L., Moerner, W. E.  
CELL PRESS.2014: 59A–60A
- **Quantitative Registration and Distribution Analysis of Multicolor 3D Super-Resolution Images of Proteins Reveals Nanoscale Spatial Organization**  
von Diezmann, A. S., Gahlmann, A., Ptacin, J. L., Shapiro, L., Moerner, W. E.  
CELL PRESS.2014: 203A
- **A Novel Function of the Bacterial Replication Initiator Protein DnaA**  
Mera, P. E., Kalogeraki, V., Shapiro, L.  
CELL PRESS.2014: 271A
- **Unique Signaling Logic within a Bacterial Cell Cycle Circuit**  
Childers, W., Xu, Q., Mathews, I. I., Mann, T. H., Blair, J. A., Deacon, A. M., Shapiro, L.  
CELL PRESS.2014: 309A
- **Using Optically Reversible Spatial Mutations to Dissect the Asymmetric Developmental Program of a Bacterium**  
Lasker, K., Abraham, A., Childers, W., Shapiro, L.  
CELL PRESS.2014: 594A
- **Global methylation state at base-pair resolution of the Caulobacter genome throughout the cell cycle.** *Proceedings of the National Academy of Sciences of the United States of America*  
Kozdon, J. B., Melfi, M. D., Luong, K., Clark, T. A., Boitano, M., Wang, S., Zhou, B., Gonzalez, D., Collier, J., Turner, S. W., Korlach, J., Shapiro, L., McAdams, et al  
2013; 110 (48): E4658-67
- **Global methylation state at base-pair resolution of the Caulobacter genome throughout the cell cycle.** *Proceedings of the National Academy of Sciences of the United States of America*  
Kozdon, J. B., Melfi, M. D., Luong, K., Clark, T. A., Boitano, M., Wang, S., Zhou, B., Gonzalez, D., Collier, J., Turner, S. W., Korlach, J., Shapiro, L., McAdams, et al  
2013; 110 (48): E4658-67
- **Oligomerization and higher-order assembly contribute to sub-cellular localization of a bacterial scaffold.** *Molecular microbiology*  
Bowman, G. R., Perez, A. M., Ptacin, J. L., Ighodaro, E., Folta-Stogniew, E., Comolli, L. R., Shapiro, L.  
2013; 90 (4): 776-795
- **Branched signal wiring of an essential bacterial cell-cycle phosphotransfer protein.** *Structure*  
Blair, J. A., Xu, Q., Childers, W. S., Mathews, I. I., Kern, J. W., Eckart, M., Deacon, A. M., Shapiro, L.  
2013; 21 (9): 1590-1601
- **Retrospective. Francois Jacob (1920-2013).** *Science*  
Shapiro, L., Losick, R.  
2013; 340 (6135): 939-?
- **Francois Jacob (1920-2013)** *SCIENCE*  
Shapiro, L., Losick, R.  
2013; 340 (6135): 939-939

- **Quantitative Multicolor Subdiffraction Imaging of Bacterial Protein Ultrastructures in Three Dimensions** *NANO LETTERS*  
Gahlmann, A., Ptacin, J. L., Grover, G., Quirin, S., von Diezmann, A. R., Lee, M. K., Backlund, M. P., Shapiro, L., Piestun, R., Moerner, W. E.  
2013; 13 (3): 987-993
- **Caulobacter chromosome in vivo configuration matches model predictions for a supercoiled polymer in a cell-like confinement** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Hong, S., Toro, E., Mortensen, K. I., de la Rosa, M. A., Doniach, S., Shapiro, L., Spakowitz, A. J., McAdams, H. H.  
2013; 110 (5): 1674-1679
- **Chromosome architecture is a key element of bacterial cellular organization** *CELLULAR MICROBIOLOGY*  
Ptacin, J. L., Shapiro, L.  
2013; 15 (1): 45-52
- **Deciphering the Transcriptional Landscape of *Caulobacter crescentus* at Base Pair Resolution** *11th International Conference on Computational Methods in Systems Biology (CMSB)*  
Zhou, B., Schrader, J., Christen, B., McAdams, H., Shapiro, L.  
SPRINGER-VERLAG BERLIN.2013: 247-247
- **Life in a Three-dimensional Grid** *JOURNAL OF BIOLOGICAL CHEMISTRY*  
Shapiro, L.  
2012; 287 (45)
- **Osmolality-Dependent Relocation of Penicillin-Binding Protein PBP2 to the Division Site in *Caulobacter crescentus*** *JOURNAL OF BACTERIOLOGY*  
Hocking, J., Priyadarshini, R., Takacs, C. N., Costa, T., Dye, N. A., Shapiro, L., Vollmer, W., Jacobs-Wagner, C.  
2012; 194 (12): 3116-3127
- **Three-Dimensional Super-Resolution Imaging of the Midplane Protein FtsZ in Live *Caulobacter crescentus* Cells Using Astigmatism** *CHEMPHYSICEM*  
Biteen, J. S., Goley, E. D., Shapiro, L., Moerner, W. E.  
2012; 13 (4): 1007-1012
- **Structure of the pilus assembly protein TadZ from *Eubacterium rectale*: implications for polar localization** *MOLECULAR MICROBIOLOGY*  
Xu, Q., Christen, B., Chiu, H., Jaroszewski, L., Klock, H. E., Knuth, M. W., Miller, M. D., Elsigler, M., Deacon, A. M., Godzik, A., Lesley, S. A., Figurski, D. H., Shapiro, et al  
2012; 83 (4): 712-727
- **An SMC ATPase mutant disrupts chromosome segregation in *Caulobacter*** *MOLECULAR MICROBIOLOGY*  
Schwartz, M. A., Shapiro, L.  
2011; 82 (6): 1359-1374
- **Three-dimensional superresolution colocalization of intracellular protein superstructures and the cell surface in live *Caulobacter crescentus*** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Lew, M. D., Lee, S. F., Ptacin, J. L., Lee, M. K., Twieg, R. J., Shapiro, L., Moerner, W. E.  
2011; 108 (46): E1102-E1110
- **The Three-Dimensional Architecture of a Bacterial Genome and Its Alteration by Genetic Perturbation** *MOLECULAR CELL*  
Umbarger, M. A., Toro, E., Wright, M. A., Porreca, G. J., Bau, D., Hong, S., Fero, M. J., Zhu, L. J., Marti-Renom, M. A., McAdams, H. H., Shapiro, L., Dekker, J., Church, et al  
2011; 44 (2): 252-264
- **Live-cell single-molecule and super-resolution imaging in bacteria**  
Coupland, B., Haas, B. L., Hoyer, E., Koropatkin, N., Matson, J., DiRita, V., Martens, E., Shapiro, L., Moerner, W. E., Biteen, J. S.  
AMER CHEMICAL SOC.2011
- **The essential genome of a bacterium** *MOLECULAR SYSTEMS BIOLOGY*  
Christen, B., Abeliuk, E., Collier, J. M., Kalogeraki, V. S., Passarelli, B., Coller, J. A., Fero, M. J., McAdams, H. H., Shapiro, L.  
2011; 7
- **Mutations in the nucleotide binding pocket of MreB can alter cell curvature and polar morphology in *Caulobacter*** *MOLECULAR MICROBIOLOGY*



- Dye, N. A., Pincus, Z., Fisher, I. C., Shapiro, L., Theriot, J. A.  
2011; 81 (2): 368-394
- **Assembly of the Caulobacter cell division machine** *MOLECULAR MICROBIOLOGY*  
Goley, E. D., Yeh, Y., Hong, S., Fero, M. J., Abeliuk, E., McAdams, H. H., Shapiro, L.  
2011; 80 (6): 1680-1698
  - **The Architecture and Conservation Pattern of Whole-Cell Control Circuitry** *JOURNAL OF MOLECULAR BIOLOGY*  
McAdams, H. H., Shapiro, L.  
2011; 409 (1): 28-35
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