

CURRICULUM VITAE

JOHN LEE SPUDICH

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CURRENT TITLE: Robert A. Welch Distinguished Chair in Chemistry
Director, Center for Membrane Biology
Professor, Department of Biochemistry & Molecular Biology
and Department of Microbiology & Molecular Genetics

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BIRTH: Oct 4, 1945, Illinois USA **CITIZENSHIP:** USA, Italy

EDUCATION: B.S. Mathematics, 1963-1967, University of Illinois, Urbana
Ph.D. Biophysics, 1972-1976, University of California, Berkeley

POSTDOCTORAL:

1976-1978: Jane Coffin Childs Fellow; Laboratory of R. Sager, Department of Microbiology and Molecular Genetics, Harvard Medical School, Boston MA.

1978-1980: NIH Fellow; Laboratory of W. Stoeckenius, Cardiovascular Research Institute and Department of Biochemistry and Biophysics, University of California Medical School, San Francisco CA.

ACADEMIC APPOINTMENTS:

2002-PRESENT: Director, Center for Membrane Biology; Professor, Department of Biochemistry & Molecular Biology, UT-Houston Medical School; Cross-appointment: Department of Microbiology & Molecular Genetics.

1991-2002: Professor, Department of Microbiology & Molecular Genetics, UT-Houston Medical School; Cross-appointment: Department of Biochemistry & Molecular Biology.

Aug 1999-Feb 2000: Burroughs-Wellcome Visiting Professor, MRC Laboratory of Molecular Biology, Structural Studies Division, Group of R. Henderson, Cambridge UK. Crystallography of sensory rhodopsins.

1989-90 (Oct-Jan) & 1983 (Jun-Sep): Visiting Professor, Laboratory of H.G. Khorana, Department of Chemistry, Massachusetts Institute of Technology, Cambridge, MA. Gene synthesis of sensory rhodopsins.

1988-1991: Professor, Albert Einstein College of Medicine.

1984-1988: Associate Professor, Albert Einstein College of Medicine.

1980-1984: Assistant Professor, Department of Anatomy & Structural Biology and Department of Physiology & Biophysics, Albert Einstein College of Medicine, Bronx, NY.

1978-1980: Postdoctoral Fellow; Laboratory of W. Stoeckenius, Cardiovascular Research Institute and Department of Biochemistry and Biophysics, University of California Medical School, San Francisco, CA.

1976-1978: Postdoctoral Fellow; Laboratory of R. Sager, Department of Microbiology and Molecular Genetics, Harvard Medical School, Boston, MA.

1972-1976: Graduate Student; Laboratory of D.E. Koshland, Jr., Department of Biochemistry, University of California, Berkeley, CA.

1970-1972: Research Assistant; Laboratories of A. Falaschi & G. Cassani, CNR Institute of Genetics, University of Pavia, Italy.

HONORS AND AWARDS:

National Merit Scholar 1963
Edmund J. James Scholar 1963-1967 (University of Illinois)
Jane Coffin Childs Fellow 1976-1979
Jane Coffin Childs Research Award 1980
Irma T. Hirschl Career Scientist Award 1981-1986
Named William M. Wheless III Professor in the Biomedical Sciences, 1997
Burroughs-Wellcome Fellow, Medical Research Council, Cambridge, England, 1999-2000
Appointed Life Member, Clare Hall, Cambridge, England, 2000
Appointed Robert A. Welch Distinguished Chair in Chemistry, 2002
American Society for Photobiology Research Award, 2003
UTHSC-H President's Scholar Award for Excellence in Research, 2003
NIH MERIT Award, 2003-2013
Elected Fellow of the American Academy of Microbiology, 1996
Elected Fellow of the American Academy of Arts and Sciences, 2007

PROFESSIONAL ORGANIZATIONS:

National Memberships:

American Society for Photobiology (ASP, President 2001-2002),
American Chemical Society, Biophysical Society, American Society for Microbiology
NIH PCMB Study Section 2006-2010, *ad hoc* BBM Study Section 2013
Coordinating Board, Molecular Biology Consortium for Synchrotron X-ray Beamline 4.2.2
Development, Berkeley CA (2003-Present)
American Academy of Microbiology & American Academy of Arts and Sciences

International:

President, International Union of Photobiology, 2014-2018
Vice-President, International Union of Photobiology, 2010-2014
Chairman, International Advisory Committee on Retinal Proteins 2009-2010
Chair, 30th ASP Meeting, Quebec City, Canada, Nov 2002
Chair, 14th International Conference on Retinal Proteins, Santa Cruz CA, Aug 2010
Co-Founder (with Winslow Briggs), Gordon Research Conference on Photosensory Receptors and Signal Transduction, 2000 (continuing biannually since then)

EDITORIAL POSITIONS:

Associate Editor, Journal of Bacteriology 1986-1991; Editorial Board, Journal of Biological Chemistry 1993-1998; Associate Editor, Photochemistry & Photobiology 1996-2000; Editorial Board, Biophysical Journal 1997-2001; Co-Editor (J.L. Spudich & B. Satir), Modern Cell Biology Vol 10: *Sensory Reception and Signal Transduction*, Wiley Liss, Inc 1991; Co-Editor (W. Briggs & J.L. Spudich), *Handbook of Photosensory Receptors*, Wiley-VCH, 2005.

CURRENT GRANT SUPPORT:

NIH R01GM027750 (PI: Spudich) 04/01/1980-03/31/2021
"Structure & Function of Microbial Sensory Rhodopsins"

NIH U01MH109146 (PIs: Spudich, Janz, and Dragoi) 09/21/2015-06/30/2018
"Anion Channelrhodopsin-based Viral Tools to Manipulate Brain Networks in Behaving Animals"

Hermann Eye Fund (PI: Spudich) 09/01/2011-08/31/2016
"Naturally Designed Channelrhodopsins for Optogenetic Vision Restoration"

PUBLICATIONS:

Refereed Original Articles in Journals

- Spudich, J.L. and Koshland, D.E., Jr. (1975) Quantitation of the sensory response in bacterial chemotaxis. *Proc. Natl. Acad. Sci. USA* 72: 710-713.
- Spudich, J.L. and Koshland, D.E., Jr. (1976) Non-genetic individuality: Chance in the single cell. *Nature* 262: 467-471.
- Spudich, J.L. and Koshland, D.E., Jr. (1979) A specific inactivator of flagellar reversal in chemotactic *Salmonella typhimurium*. *J. Bacteriology* 139: 442-447.
- Spudich, J.L. and Stoeckenius, W. (1979) Photosensory and chemosensory behavior of *Halobacterium halobium*. *J. Photobiophys. Photobiophys.* 1: 43-53.
- Spudich, J.L. and Stoeckenius, W. (1980) Light-regulated retinal-dependent reversible phosphorylation of *Halobacterium halobium* proteins. *J. Biol. Chem.* 255: 5501-5503.
- Spudich, J.L. and Sager, R. (1980) Regulation of the *Chlamydomonas* cell cycle by light and dark. *J. Cell Biol.* 85: 136-146.
- Spudich, E.N. and Spudich, J.L. (1982) Control of transmembrane ion fluxes to select halorhodopsin-deficient and other energy transduction mutants of *Halobacterium halobium*. *Proc. Natl. Acad. Sci. USA* 79: 4308-4312.
- Bogomolni, R.A. and Spudich, J.L. (1982) Identification of a third rhodopsin-like pigment in phototactic *Halobacterium halobium*. *Proc. Natl. Acad. Sci. USA* 79: 6250-6254.
- Spudich, E.N. and Spudich, J.L. (1982) Measurement of light regulated phosphoproteins of *Halobacterium halobium*. *Methods in Enzymology* 26: 213-216.
- Spudich, J.L. and Bogomolni, R.A. (1983) Spectroscopic discrimination of the three rhodopsin-like pigments in *Halobacterium halobium* membranes. *Biophysical J.* 43: 243-246.
- Krupinski, J., Spudich, J.L. and Hammes, G.G. (1983) Phase-lifetime spectrophotometry of membranes from ion-flux mutants of *Halobacterium halobium*. *J. Biol. Chem.* 258: 7964-7967.

- Spudich, E.N., Bogomolni, R.A. and Spudich, J.L. (1983) Genetic and biochemical resolution of the chromophoric polypeptide of halorhodopsin. *Biochem. Biophys. Res. Comm.* 112: 332-338.
- Spudich, J.L. and Bogomolni, R.A. (1984) The mechanism of colour discrimination by a bacterial sensory rhodopsin. *Nature* 312: 509-513.
- Ehrlich, B.E., Schen, C.R. and Spudich, J.L. (1984) Bacterial rhodopsins monitored with fluorescent dyes in vesicles and *in vivo*. *J. Memb. Biol.* 82: 89-94.
- Spudich, E.N. and Spudich, J. L. (1985) Biochemical characterization of halorhodopsin in native membranes. *J. Biol. Chem.* 260: 1208-1212.
- Sundberg, S.A., Bogomolni, R.A. and Spudich, J.L. (1985) Selection and properties of phototaxis-deficient mutants of *Halobacterium halobium*. *J. Bacteriology* 164: 282-287.
- Spudich, J.L. (1985) Color-sensing by phototactic *Halobacterium halobium*. In: *Sensory Perception and Transduction in Aneural Organisms*, (Colombetti, G. and Lenci, F., eds.) Alan R. Liss, Inc. pp. 113-118.
- Spudich, J.L., McCain, D.A., Nakanishi, K., Okabe, M., Shimizu, N., Rodman, H., Honig, B. and Bogomolni, R.A. (1986) Chromophore/protein interaction in bacterial sensory rhodopsin and bacteriorhodopsin. *Biophysical J.* 49: 479-483.
- Sundberg, S.A., Alam, M. and Spudich, J.L. (1986) Excitation signal processing times in *Halobacterium halobium* phototaxis. *Biophysical J.* 50: 895-900.
- Spudich, E.N., Sundberg, S.A., Manor, D. and Spudich, J.L. (1986) Properties of a second sensory rhodopsin in *Halobacterium halobium*. *Proteins* 1: 239-246.
- McCain, D.A., Amici, L.A. and Spudich, J.L. (1987) Kinetically resolved states of the *Halobacterium halobium* flagellar motor switch and modulation of the switch by sensory rhodopsin I. *J. Bacteriology* 169: 4750-4758.
- Bogomolni, R.A. and Spudich, J.L. (1987) The photochemical reactions of bacterial sensory rhodopsin-I: Flash photolysis study in the one microsecond to eight second time window. *Biophysical J.* 52: 1071-1075.
- Hasselbacher, C.A., Spudich, J.L. and Dewey, T.G. (1988) Circular dichroism of halorhodopsin: Comparison with bacteriorhodopsin and sensory rhodopsin I. *Biochemistry* 27: 2540-2546.
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- Manor, D., Hasselbacher, C.A. and Spudich, J.L. (1988) Membrane potential modulates photocycling rates of bacterial rhodopsins. *Biochemistry* 27: 5843-5848.
- Spudich, E.N., Hasselbacher, C.A. and Spudich, J.L. (1988) A methyl-accepting protein associated with bacterial sensory rhodopsin I. *J. Bacteriology* 170: 4280-4285.
- Spudich, E.N., Takahashi, T. and Spudich, J.L. (1989) Sensory rhodopsins I and II modulate a methylation/demethylation system in *Halobacterium halobium* phototaxis. *Proc. Natl. Acad. Sci. USA* 20: 7746-7750.
- Yan, B., Takahashi, T., McCain, D.A., Rao, V.J., Nakanishi, K. and Spudich, J.L. (1990) Effects of modifications of the retinal β -ionone ring on archaeobacterial sensory rhodopsin I. *Biophysical J.* 57: 477-483.

- Yan, B., Takahashi, T., Johnson, R., Derguini, F., Nakanishi, K. and Spudich, J.L. (1990) All-*trans*/13-*cis* isomerization of retinal is required for phototaxis signaling by sensory rhodopsins in *Halobacterium halobium*. *Biophysical J.* 57: 807-814.
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- Yan, B., Takahashi, T., and Spudich, J.L. (1991) Identification of signaling states of a sensory receptor by modulation of lifetimes of stimulus-induced conformations: The case of sensory rhodopsin II. *Biochemistry* 30: 10686-10692.
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- Jung, K.-H. and Spudich, J.L. (1996) Protonatable residues at the cytoplasmic end of transmembrane helix-2 in the signal transducer HtrI control photochemistry and function of sensory rhodopsin I. *Proc. Natl. Acad. Sci. USA* 93: 6557-6561.
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- Yan, B., Spudich, E.N., Sheves, M., Steinberg, G., and Spudich, J.L. (1997) Complexation of the signal transducing protein HtrI to sensory rhodopsin I and its effect on thermodynamics of signaling state deactivation. *J. Phys. Chem.* 101:109-113.

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- Spudich, E.N., Zhang, W., Alam, M., and Spudich, J.L. (1997) Constitutive signaling of the phototaxis receptor sensory rhodopsin II from disruption of its protonated Schiff base-Asp73 salt bridge. *Proc. Natl. Acad. Sci. USA* 94: 4960-4965.
- Zhang, X.-N. and Spudich, J.L. (1997) His-166 is critical for active site proton transfer and phototaxis signaling by sensory rhodopsin I. *Biophys. J.* 73: 1516-1523.
- Jung, K.-H. and Spudich, J.L. (1998) Suppressor mutation analysis of the sensory rhodopsin I / transducer complex: Insights into the color-sensing mechanism. *J. Bacteriology* 180: 2033-2042.
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