

## CURRICULUM VITAE

**Name:** Lynn William Enquist

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**Date of Birth:** October 23, 1945; Denver, Colorado

**Citizenship:** United States

**Marital Status:** Married to Kathleen Marie Enquist  
One son, Brian Joseph Enquist, born 3/4/69; received Ph.D. in Biology 1998.

**Home Address:** 151 Patton Avenue, Princeton New Jersey, 08540  
Telephone: (609) 497-4589

### Education:

1963 Graduated from Milbank High School, Milbank, South Dakota  
1967 B.S. in Bacteriology, South Dakota State University, Brookings, South Dakota  
1967-1968 Attended Graduate School, Department of Microbiology, University of Minnesota, Minneapolis, Minnesota  
1971 Ph.D. in Microbiology, Medical College of Virginia, Richmond, Virginia

### Training and Fellowships

1965-1967 Research Assistant, Department of Microbiology, South Dakota State University, anaerobic actinomycete biology, *Dr. Gordon Robertstad*  
1967 Commissioned Second Lieutenant, USAR-Medical Service Corps  
1967-1968 Woodrow Wilson Fellow, University of Minnesota, streptomyces biology and DNA taxonomy, *Dr. S. G., Bradley*  
1968-1969 National Science Foundation Traineeship, Medical College of Virginia, streptomyces biology and DNA taxonomy, *Dr. S.G. Bradley*  
1971 National Science Foundation Postdoctoral Trainee, *Salmonella* phage P22 genetics, *Dr. R. Kolstad*  
1971-1973 Postdoctoral Fellow, Department of Cell Biology, Roche Institute of Molecular Biology; Nutley, NJ, *E. coli* phage Lambda DNA replication, *Dr. Ann Skalka*  
1973 Staff Fellow, Laboratory of Molecular Genetics, Head: Dr. Philip Leder, NICHD-NIH, Bethesda, MD, Bacteriophage Lambda site specific recombination, *Dr. R. Weisberg*  
1973 Call to Active Duty, Public Health Service (LTCMDR USPHS)  
1973-1977 Scientist, Microbial Genetics Section, Laboratory of Molecular Genetics, Head: Dr. Philip Leder, NICHD-NIH, Bethesda, Maryland, *E. coli* phage Lambda genetics, site specific recombination; recombinant DNA technology, *Dr. R. Weisberg*  
1977-1981 Scientist, Virus Tumor Biology Section, Laboratory of Molecular Virology, VOP, Head: Dr. Robert Manaker, NCI-NIH, Bethesda, Maryland, Recombinant DNA technology, herpes simplex genetics, *Dr. G. Vande Woude*  
1981-1984 Research Director, Animal health care, corn tissue culture, biotechnology. Molecular Genetics, Inc., 10320 Bren Road East, Minnetonka, Minnesota 55343.  
1984-1990 Research Leader, Molecular Genetics, Viral Diseases Group; Herpesvirus membrane protein biology and genetics, E. I. du Pont de Nemours & Company, Experimental Station, Wilmington, Delaware 19880-0328  
1991-1993 Senior Research Fellow, Molecular Genetics; Herpesvirus neurotropism, vectors and genetics; DuPont Merck Pharmaceutical Company, Wilmington, Delaware 19880-0328  
1993-2003 Professor of Molecular Biology, Department of Molecular Biology, Princeton University, Princeton New Jersey 08544  
2003-2004 Professor and Associate Chair, Department of Molecular Biology, Princeton University, Princeton New Jersey 08544  
2004-2007 Professor and Chair, Department of Molecular Biology, Princeton University, Princeton New Jersey 08544  
2007- 2013 Henry L. Hillman Professor and Chair, Department of Molecular Biology, Princeton University, Princeton New Jersey 08544  
2013- Henry L. Hillman Professor, Department of Molecular Biology,

Princeton University, Princeton New Jersey 08544

**Societies:**

American Society for Microbiology  
American Association for the Advancement of Science  
American Society for Virology  
Society for Neuroscience  
Society for Neurovirology

**Honors, Academic Service and Other Special Scientific Recognition**

Phi Kappa Phi; National Honor Society  
Sigma Xi; full member  
Woodrow Wilson Fellow; 1967  
Theobald Smith Society (ASM) Lecture; Hoffman-LaRoche, Dec. 1976. "The Use of Bacteriophage  $\lambda$  as an EK-2 Vector"  
Editorial Board, Journal of Virology, 1979-1981, 1989-1991, 1992-1994, 2014-  
Editorial Board, Virology, 1992-1994  
Editor, Journal of Virology, 1994-2002  
Editor in chief, Journal of Virology, 2002-2012  
Editorial Board, Journal of Neurovirology, 1994 -  
Instructor, Advanced Bacterial Genetics Course, Cold Spring Harbor Laboratory, Summers 1981, 1982, 1983, 1984, 1985  
Convener, The Biochemistry of Integration and Excision, 82nd Annual American Society for Microbiology Meeting, Atlanta, Georgia, 1982  
Scientific Advisory Committee, University of Minnesota Biotechnology Research Center, 1983  
Research Affiliate, Pacific Biomedical Research Center, July 1983-August 1984, University of Hawaii at Manoa, Honolulu  
Distinguished Alumnus, Department of Microbiology, South Dakota State University, Brookings, South Dakota, 1984  
Distinguished Alumnus, School of Basic Sciences, Virginia Commonwealth University, Richmond, Virginia, 1984.  
Convener, The Second Half of the Genetic Code: Is Molecular Genetics Ready for Protein Structure Technology?, American Society for Microbiology Meeting, Atlanta, Georgia 1987  
Local Planning Committee 12th International Herpes Workshop, University of Pennsylvania July 1987  
Member of the Advisory Board, Institute of Biotechnology, Virginia Commonwealth University, Richmond, VA, 1987-1995.  
Guest Lecturer, Department of Molecular Biology, Princeton University, 1986, 1987  
Department Associate; Dept. of Molecular Biology, Princeton University, 1987 - 1993  
Adjunct Associate Professor; Department of Microbiology, University of Pennsylvania, 1988-1996  
Invited Lecturer, Distinguished Corporate Scientist Lecture Series, Center for Biotechnology, State University of New York at Stony Brook, January 26, 1988  
NIH Study Section, Microbial Physiology and Genetics, Special Reviewer, 1983, 1984, Full Member 1985-86  
NIH Study Section, Experimental Virology.  
Ad hoc reviewer, 1987-88.  
Full Member, 1988-91;  
Chairman, 1990-92  
University of Delaware Agricultural Biotechnology Center and Biocontainment Facility Planning Committee, 1991  
Chair-elect of DNA Viruses, Division S, ASM, 1992  
Chair of DNA Viruses, Division S, ASM, 1993  
Panel member, Site Visit, In Depth Review of US National Animal Disease Center Virology Swine Research Unit 1993.  
Fellow, American Academy of Microbiology, 1994  
American Society of Virology Nominating Committee, 1995  
Pfizer Animal Health Distinguished Speaker - University of Nebraska, 4/3/95  
Commissioner, New Jersey State Commission on Cancer Research. 1996-1999. Appointed by Governor C. Whitman.  
Council Delegate, Medical Sciences Section, AAAS - 1997-2000, elected.  
Editorial Committee, Annual Reviews of Microbiology, 1997-2001.  
Committee on Election to Fellowship; American Academy of Microbiology, 1997 - elected.  
Subak-Sharpe Lecturer, International Herpesvirus Workshop, San Diego, 1997.  
American Society for Microbiology Annual Meeting Colloquium Planning Committee, 1996-1998.  
AAAS Fellow, elected 1998  
Election to Fellowship Committee, American Academy of Microbiology, 1998-2002.  
Councilor at Large, American Society for Microbiology, 2000-2002, elected.  
Councilor for Animal Virology, American Society for Virology, 2000-2003, elected.  
Member, NIGMS Biomedical Research and Research Training subcommittee A, 2000-2004.

Co-chair, Viruses Gordon Conference: 2001  
2001 President's Award for Teaching Excellence, Princeton University  
Plenary Speaker, 2002 German Society for Virology  
Chair, Viruses Gordon Conference: 2003  
Plenary Speaker, 2003 American Society for Virology  
Plenary Speaker, 2003 European Society for Veterinary Virology  
Council Delegate, Medical Sciences AAAS, elected 2003-2006  
8<sup>th</sup> Richard J. Klein Memorial Lecturer, NYU 2003  
President-elect, American Society for Virology 2003-2004  
President, American Society for Virology 2004-2005  
Organizing and Scientific Advisory Committee, 2<sup>nd</sup> ESVV Veterinary Herpesvirus Symposium, 2005  
Frank N. Nelson distinguished Lecturer in Mol. Biology, Biotechnology & Medicine, Montana State University, 2005  
Javitz Investigator Award, NIH; NINDS 2005-2011  
Board of Directors, AAAS, 2005-2009; Elected  
Member of the National Science Advisory Board for Biosecurity, 2005-  
Plenary Speaker, Glasgow Virology Workshop, Glasgow, Scotland, 2006  
Keynote Speaker, 9<sup>th</sup> Southeastern Regional Virology Conference, Atlanta, Georgia, 2006  
Keynote Lecture, 2<sup>nd</sup> Annual Institute for Molecular Virology Symposium, Minneapolis, Minnesota, 2006  
Keynote Speaker, 4<sup>th</sup> International Workshop on the Pathogenesis of Marek's Disease, University Delaware, 2006  
Member, Scientific Council, Pasteur Institute, 2007-  
Keynote Lecturer, International Virology Conference, Wuhan China, 2007  
Member, Scientific Advisory Board CellNetworks; University Heidelberg, Germany, 2008-  
Member, Scientific Advisory Board Wellcome Trust program: AxoNet, UK, 2008 -  
Member, Scientific Advisory Board, U. Alberta, Viral Pathogenesis program, 2008-  
Member, Scientific Advisory Board, Mount Sinai/NYU training grant on Virus host interactions, 2009-  
Scientific advisor, HHMI Investigator Review board, 2010  
Elected to the American Academy of Arts and Sciences, 2010  
Founding editor in chief, Annual Reviews of Virology, 2012  
Honorary Doctorate, University of Ghent, Brussels, Belgium, 2013  
Keynote Speaker, 32<sup>nd</sup> Annual Meeting American Society for Virology Symposia, Pennsylvania State University, State College, Pennsylvania, 2013  
President-elect, American Society for Microbiology, 2014

### Research Interests

The genetics and molecular biology of DNA viruses with a special emphasis on neurotropic herpes viruses and molecular mechanisms of pathogenesis; structure and function of viral membrane glycoproteins; neurotropism of herpesviruses; the molecular basis for viral parasitism; virus engineering; the assembly of viral envelopes; therapeutic gene delivery, vaccine and diagnostic reagent development; biotechnology, recombination and replication.

### Teaching Experience:

Instructor, Medical Microbiology course, Uniformed Services University, Bethesda, Maryland, 1977.  
Instructor, Advanced Bacterial Genetics course at Cold Spring Harbor Labs, 1981-1985.  
Lecturer, Mol Biol 505, Princeton, with T. Silhavy. 2-4 lectures per year on bacterial genetics. 1984 to present.  
Instructor, MOL459. Viruses: Strategy and Tactics. Fall Semester, thirty five lectures. 1994 – present.  
Lecturer, NEU501, Neuroscience: From Molecules to Systems to Behavior. Fall Semester, one lecture. 2009 – present.  
Numerous lectures and seminars at universities and institutions around the world.

### University Committees

Chairman, Molecular Biology Radiation Safety. 1994-2004  
Interdepartmental Committee for the Program in Neurosciences. 1994-1997.  
University Committee on Student Life 1995- 1997  
University Committee on Course of Study 1996- 1999.  
Faculty Advisory Committee on Appointments and Advancements (Committee of Three) 2002/2003  
Neuroscience Certificate, co-director, with Jonathan Cohen, 2001-2004  
Executive Committee, Laboratory Animal Resources, 2008-  
Trustee ad hoc Committee on Diversity – 2012  
University Conflict of Interest Committee – 2012

### Participation on Ph.D. Committees:

Nancy Trun, Princeton University; T. Silhavy, mentor.  
Gabriella Olmedo, University of Pennsylvania; P. Youngman, mentor  
Marvin Sommer, Louisiana State University; R. Courtney, mentor.  
Donald Sedora, University of Pennsylvania; G. Cohen, mentor.

David Poulsen, University of Delaware; C. Keeler, mentor .  
John Carlson, Princeton University; T. Silhavy, mentor.  
Christopher Handler, University of Pennsylvania; G. Cohen, mentor.  
Janet Huie, Princeton University; T. Silhavy, mentor.  
David Walter, Princeton University; G. Waters, mentor.  
Kimberly Paul, Princeton University; G. Waters, mentor.  
Cathy Patterson, Princeton University; T. Shenk, mentor.  
Christine Cosma, Princeton University; T. Silhavy, mentor.  
Karen Bernd, Princeton University; E. Stuhl, mentor.  
Michael Romanowski, Princeton University, T. Shenk, mentor.  
Donald Huddler, Princeton University, C. Schutt, mentor.  
Mansuo Lu, Princeton University, T. Shenk, mentor.  
Katherine Gibson, Princeton University, T. Silhavy mentor.  
Deborah Freedman, Princeton University, A. Levine mentor.  
Judy Yankowitz, Princeton University, P. Schedl mentor.  
Nicholas Hand, Princeton University, T. Silhavy mentor  
Jill Reiss, Princeton University, T. Silhavy mentor.  
Jill Bechtel, Princeton University, T. Shenk, mentor.  
Catherine Blankenship, Princeton University, T. Shenk, mentor  
Sarah Connelly, University of Pennsylvania, G. Cohen mentor  
Julie Heider, T. Shenk, mentor  
Mike Overholtzer, A. Levine, mentor  
Amy Rizzitello, T. Silhavy, mentor  
Kenneth Mok, Bonnie Bassler, mentor  
Josh Oeltjen, Tom Shenk, mentor.  
Melissa Miller, Bonnie Bassler, mentor  
Maria Silva, co advisor with Tom Shenk  
Dora (Pantcheva), Tom Shenk, mentor  
Christian Cuevas, Tom Shenk, mentor  
Helen McGraw, University of Pennsylvania, H. Friedman mentor  
Wilfred Ndifon, Simon Levin, mentor  
Andrew Womack, Tom Shenk, mentor  
Humayra Ali, Jane Flint, mentor  
Jason Huhn, Yigong Shi, mentor  
Hassana Oyibo, Cold Spring Harbor Lab, Anthony Zado, r mentor  
Erin O'Keefe, Tom Shenk, mentor  
Xin Xu, Liz Gavis, mentor  
John Rickgauer, David Tank, mentor  
Jasdave Chahal, Jane Flint, mentor  
Sean Liu, Tom Shenk, mentor  
Yihao Fan, Tom Shenk, mentor  
Jesse Hwang, Tom Shenk, mentor  
Tuo Li, Ileana Cristea, mentor  
Daniell Rowles, Ileana Cristea, mentor  
Sarah Grady, Tom Shenk, mentor  
Ben Diner, Ileana Cristea, mentor

**Summer Graduate Rotation Students, University of Pennsylvania:**

David Cutler, Summer 1990  
Charles Cook, Summer 1992

**Undergraduate Thesis Research:**

Brooks, Jessica (2013): A Set of Herpes Simplex Virus Type 1 Recombinants for Use in Neural Circuit Tracing  
Hu, Jiun-Ruey (2013): Pseudorabies Virus Entry and Egress Visualized by Fluorescence Microscopy and a pH-Sensitive Reporter  
Kratchmarov, Radomir (2013): Molecular Mechanisms of Us9-Mediated Anterograde Transport of Alphaherpes Viruses  
Porter, Derek (2012): Examination of the Effect of Tetherin Expression on Pseudorabies Virus Infection (Thesis No. 27073)  
Hassani, Daisy B. (2011): An Analysis of the Effect of Pseudorabies Virus Infection on Mitochondrial DNA. (Thesis No. 25628)  
Ludmir, Ethan Bernard (2011): A Toolbox of Pseudorabies Virus Recombinants, Derivatives, and Methods for Use in Neural Circuit Tracing. (Thesis No. 25644)  
Hudnall, Matthew T. (2010): An Imaging Analysis of Cellular Morphology in Pseudorabies Virus Infection. (Thesis No.

24337)

- Smith, Amanda C. (2009): Involvement of Kinesin-1 in Pseudorabies Virus Transport. (Thesis No. 22948)
- Gawande, Richa M. (2008): Altered Mitochondrial Distribution and Transport in the Pathogenesis of Pseudorabies Virus Infection. (Thesis No. 22628)
- Liu, Wendy W. (2008): Transport of Alpha-herpesvirus Structural Proteins in Axons. (Thesis No. 22642)
- Beylin, Marie E. (2007): In Vitro Astrocyte Responses to Pseudorabies Virus. (Thesis No. 21389)
- Cohen, Gabriel (2007): The Normalization of HIV Testing in The United States: The Effect of "Opt-Out" Routine Testing on Patient Autonomy. (Thesis No. 21394)
- Goheen, Morgan (2007): Construction and Characterization of a Pseudorabies Virus Mutants Expressing gC-GFP. (Thesis No. 21403)
- Okonkwo, Stephanie O. (2007): A Critical Review of Alzheimer's Disease Herpes Simplex Viral Pathogenesis Theory. (Thesis No. 21422)
- Bhat, Suneel Bhaskar (2006): Neuroprotective nature of the cytoplasmic prion protein and Us9 and gE intercellular trafficking: An approach using photoactivatable fluorescent molecules and live-cell imaging. (Thesis No. 19399)
- Buerki, Robin Arthur (2006): The effects of autophagy on the replication of herpes simplex virus and pseudorabies virus. (Thesis No. 20239)
- Kang, Kristopher (2006): Rotavirus vaccine implementation: Realizing the public health promise of Rotarix and Rotateq. (Thesis No. 20262)
- Piccinotti, Silvia (2006): Herpesvirus infection induces the formation of nuclear actin filaments serving as a scaffold for capsid assembly. (Thesis No. 20275)
- Zider, Jacqueline Elliott (2006): Engineering viruses to fight cancer: A review of selected antitumor therapies. (Thesis No. 20284)
- Carson, Katherine Lecker (2005): How Virulent and Attenuated Strains of PRV Counter the Apoptotic Response. (Thesis No. 19021)
- Raldow, Ann Caroline (2005): Construction of an Attenuated Herpesvirus Recombinant that Expresses a Fluorescent Red Capsid Protein. (Thesis No. 19060)
- Bartlett, Edmund (2004): Isolation and Characterization of an Indomethacin Resistant Pseudorabies Virus Mutant. (Thesis No. 17271)
- Giron, Angela (2003): Sex Hormones & Human Papillomavirus: A Synergistic Effect on Cervical Cancer. (Thesis No. 16314)
- Miller, Brian (2003): The Search for an ICP47 Homologue in PRV: Initial Characterization of the Putative UL21.5 Gene. (Thesis No. 16333)
- Shackelton, Laura (2003): The Molecular Characterization of an Ancient Herpesvirus Gene: UL7 in Pseudorabies Virus. (Thesis No. 16345)
- Bratman, Scott Victor (2002): Intramolecular Determinants of Pseudorabies Virus Glycoprotein M. Subcellular Localization. (Thesis No. 15629)
- Peebles, Carol Lee (2002): PC12 Cell Line as a Model System for PRV Infection and Viral Glycoprotein Transport in Neurons. (Thesis No. 15661)
- Chen, SuAnn S. (2001): Arecholine-Induced Depression and its Effects on the Immune System Response. (Thesis No. 13065)
- Dasgupta, Nabarun (2001): How to know a jumping gene when you see one. (Thesis No. 14504)
- Kemp, Clinton D. (2001): A comparative analysis of alpha herpesvirus Us9 homologs and molecular dissection of the conserved basic domain of PRV Us9. (Thesis No. 14519)
- Shah, Sachin D. (2001): Disseminating scientific and medical information to the public: A case study of West Nile virus in New York City in 1999 and 2000. (Thesis No. 14534)
- Hsiao, Wayland (2000): Role of Proteins Encoded by the Unique Short Region during Pseudorabies Virus Infection of Cultured Primary Avian Cells. (Thesis No. 12531)
- Kuipers, Katherine (2000): Yeast Two-Hybrid Screen for Cellular Proteins Binding to PRV Proteins Involved in Neuronal Spread. (Thesis No. 12537)
- Werner, Heidi C. (2000): Characterization of VP22: A Pseudorabies Virus Protein. (Thesis No. 12563)
- Azzam, Helen (1999): Us9: Characterization and Functional Analysis in Varicella-Zoster Virus. (Thesis No. 10817)
- Divakaruni, Monica (1999): Great Expectations: Assessing the Prospects for Human Immunodeficiency Virus Vaccine Development and Deployment. (Thesis No. 10828)
- Iofin, Ilya (1999): Regulation of Apoptosis by Pseudorabies Virus. (Thesis No. 10847) [Not Received by the Mudd Library]
- Liu, Audrey (1999): Construction of a Novel PRV-Bartha Infectious Clone. (Thesis No. 10857)
- Baynes, Jason Robert (1998): An Analysis of Reactive Oxygen Species as Initiators and Modulators of Neuronal Death. (Thesis No. 10023)

- Jones, Thomas E. (1998): Combating Drug Resistant Malaria Parasites: Development and Distribution Strategies for Antimalarial Drugs. (Thesis No. 10042)
- La, Ellen Y. (1998): Further Studies on UL21: A Pseudorabies Virus Neurovirulence Determinant. (Thesis No. 10045)
- Newton, Isabel Gala (1998): Analysis of Pseudorabies Virus AK9 Spread through Rodent Neuronal Circuits between the Retinal Ganglion Cells and the Hippocampus. (Thesis No. 10053)
- Brodsky, Igor E. (1997): Construction and Analysis of PRV Recombinants Expressing HSV-1 Glycoproteins. (Thesis No. 8980)
- Gandhi, Soniya S. (1997): Solving the HIV Crisis: Challenges in the Development and Implementation of an Effective Vaccine. (Thesis No. 8999)
- Hitchcock, Amy L. (1997): Characterization of UL21, a Pseudorabies Virus Neurovirulence Determinant. (Thesis No. 9006)
- Huang, Karen S. (1997): Construction of Infectious Pseudorabies Virus from Cosmid-cloned Subgenomic Fragments. (Thesis No. 9009)
- Lee, Christina (1997): Introducing Traditional Chinese Medicine into a Modern Medical System. (Thesis No. 9065)
- Bunya, Vatee Y. (1996): Role of the Cytoskeleton in Pseudorabies Virus Infection. (Thesis No. 7339)
- Kuo, Timothy (1996): The Role of Pseudorabies Virus Glycoproteins gE and gI in Circuit-Specific Viral Spread within the Rodent Central Nervous System. (Thesis No. 7394)
- Senecal, Emily L. (1996): The Role of Non-Essential Genes in the Infection of the Chick Embryo Visual Circuit by Pseudorabies Virus. (Thesis No. 7382)
- Barton, Gregory M. (1995): Construction of Neurotropic Herpesvirus Recombinants Carrying Novel Reporter Genes. (Thesis No. 6340)
- DeOrio, Joseph J. (1995): The P1 Cloning System as a Means for the Manipulation and Recovery of Pseudorabies Virus DNA. (Thesis No. 6326)
- Yap, Gregory S. (1995): Establishing the Chick Embryo Visual Circuit as a Model for Pseudorabies Virus Infection: Studies in Neurotropism and Virulence. (Thesis No. 6350)

**Postdocs Trained:**

Roger Watson (Molecular Genetics)  
Anamaris Colberg-Poley (NIH)  
John Weis (Molecular Genetics)  
Katherine Denniston (NIH)  
Kenichi Umene (NIH)  
J. Patrick Ryan (DuPont)  
Nels Pederson (DuPont)  
Kimberly Solomon (DuPont)  
Calvin Keeler (DuPont)  
David Thompson (DuPont-Merck)  
Gregory Gonye (DuPont-Merck)  
Anita Knapp-Ryseck (Princeton)  
Paul Husak (Princeton)  
Bruce Banfield (Princeton)  
Gregory Smith (Princeton)  
Christoph Hengartner (Princeton)  
Lisa Pomeranz (Princeton)  
Christina Paulus (Princeton)  
Alex Flood (Princeton)  
Becket Feierbach (Princeton)  
Ashley Reynolds (Princeton)  
Tracy Parker (Princeton)  
Matt Lyman (Princeton)  
Oren Kobilier (Princeton)  
Moriah Szpara (Princeton)  
Matt Taylor (Princeton)  
Orkide Koyuncu (current)  
Ester Engel (current)  
Ian Hogue (current)  
Jens Bosse (current)  
Karen Lancaster (current)  
Julian Scherer (current)

### Graduate Students:

Robert Townley (1995-1998)  
Rebecca Sparks-Thissen (1995-2000) Washington University  
Rebecca Sawyer (1996-1999) Harvard, U. Massachusetts  
Amy Brideau (1996-1999) Scripps, Maxygen  
Mark Tomishima (1997-2001) Sloan Kettering  
Tony DelRio (1998-2004)  
Neela Ray (1999-2004)  
LeighAnne Olsen (1999-2005)  
Toh Hean Ch'ng (2000-2005)  
Alana Lysholm (2001- transferred U. Michigan)  
Beth Brittle (2001-2005)  
Gwyneth Liesch (2001-2004)  
Alla Brukman (2001-2006)  
Pei Ting Chou (2002-2005)  
Rob Moder (2005-2006)  
Jennifer Griffin (2006-2007)  
Dusica Curanovic (2005-2009)  
Kelly McCarthy (2006-2011)  
Tal Kramer (2008-2012 )  
Andrea Granstedt (2007-2013)  
Anthony Ambrosini (2007-2014)  
Ren Song (2010- )  
Oliver Hao Huang (2013- )  
Alex Gellar (2014 - )  
Shree Tanneti (2014 - )

### Career Summary:

My career falls into four segments. The first segment is my initial training in microbiology. My BS and PhD training was in classical bacteriology and microbiology. As an undergraduate I was trained to work with aerobic and anaerobic actinomycetes, streptomycetes, nocardia and mycobacteria. I worked as a student-helper in the bacteriology department my entire undergraduate career. I cleaned microscopes, prepared media, TA'd a variety of bacteriology and mycology lab courses, bled animals (sheep, mice, rabbits, guinea pigs, geese), made various antisera, made complement, collected rumen samples and purified anaerobic actinomycetes from pathology samples of animal abscesses. My PhD brought me closer to molecular biology in that I worked on studying DNA homologies in the streptomycetes, nocardia and mycobacteria using the then brand new technique of DNA-DNA hybridization and G+C determination using the Model E centrifuge to determine DNA buoyant density in CsCl. A secondary project concerned the characterization of a pigment made during sporulation that bound to DNA. This problem directed my interest in developmental biology and I searched for a system where I could study gene regulation at the molecular level in a genetically facile organism.

The second segment of my career is my training in bacteriophage lambda biochemistry and genetics. My first postdoctoral training was in lambda DNA replication and recombination. I thrived on the competitive environment of lambdaology. The intellectual climate in the early 1970's surrounding lambda was very stimulating. For example, not only were my replication experiments going well, my first experiments in genetic engineering were done in 1972-73 with Ann Skalka and Pat Gage at The Roche Institute of Molecular Biology when we made exciting, but futile attempts to clone the *Bombyx mori* silk gene into Lambda (before restriction enzymes). My work directed to understanding the overlapping pathways of replication and recombination was well accepted. I could see the power of a combined biochemical/genetics approach, but I did not have any training in bacterial genetics so I did a second postdoc with Bob Weisberg at the NIH to learn lambda genetics. My interest in recombination lead me to take on the intricate problem of site-specific recombination. The NIH was an incredibly interactive environment and I rapidly honed my genetic skills as well as my intellect at the weekly "lambda lunches" where one's ideas and spirit were tested with vigor. I had the most productive period of my career in lambda when I was in Weisberg's lab.

Philip Leder was the chief of the laboratory and his interest plus enthusiastic support for developing new tools for gene cloning led me into the third segment of my career which was directed at recombinant DNA technology. Nat Sternberg, David Tiemeier and I developed the WES series of lambda vectors and Nat and I developed a popular system of *in vitro* packaging. I was excited about this new technology and became a zealot, developing many new aspects of the technology and collaborating with several labs to teach them the new systems. I became involved in the politics of recombinant DNA taking part in many sessions of the Recombinant DNA Advisory Committee and participating in the certification of the first *E. coli* vector systems. During this period, my research plans broadened due to the power of recombinant DNA technology. My lab was adjacent to George Khoury's and he convinced me that I could transfer my knowledge and insight about bacterial viruses to problems in eukaryotic viruses. I accepted a staff position in George Vande Woude's lab in the NCI after a short stint on the faculty of The Uniformed Services University of the Health Sciences. George's programs included both herpesvirus and retrovirus research and he had the required P4 containment lab needed to do recombinant DNA experiments with those viruses. George gave me my own lab and a chance to see what I could do with recombinant DNA. We were very successful in that we cloned both herpes simplex virus type 1 DNA fragments as well as integrated RNA tumor virus genomes. These

were the world's first reported P4 recombinant DNA experiments with herpes and retroviruses. I learned a great deal about biocontainment in my hands-on experience in the P4 facilities at Fort Detrick and in the certification and operation of Vande Woude's P4 facility in Building 41 at the NIH.

Our success with herpesvirus cloning prompted me to redirect my research to problems in herpes biology. I was attracted to the glycoproteins because of the problems then emerging in understanding membrane protein export and virus assembly. This decision led to my fourth career segment. My lab's first experiments on herpes glycoproteins came at the time that Genentech was hitting the stock market and biology became a business possibility. I realized that herpes glycoproteins may well be valuable in vaccine technology. I had been approached by several start up genetic engineering companies and I decided to take the plunge and become the research director of Molecular Genetics, Inc. in Minnetonka, Minnesota with the charter to create new vaccines and genetically engineered plants for agricultural markets. I had a very exciting three years at Molecular Genetics. However, I realized that I was more enthusiastic about the research than I was about the business of science and the entrepreneurial life. With the encouragement of Philip Leder, a senior Du Pont consultant, I accepted a position of Research Leader in Du Pont's Central Research and Development department to continue my career in research. Du Pont gave me the opportunity to participate in many aspects of science management as well as the freedom to run a basic research laboratory to study herpesvirus assembly and envelope protein function.

On January 1, 1991, I resigned from Du Pont and joined a new joint venture between Merck and Du Pont called Du Pont Merck Pharmaceutical Company. Initially, I was one of three research managers in Viral Diseases Research with responsibility for herpesvirus research programs. My own laboratory worked on problems of identifying targets for antivirals in herpesvirus assembly. I was promoted to Senior Research Fellow with research responsibilities in using neurotropic herpesviruses in CNS research. Since 1989, I devoted my entire lab to the study of how neurotropic herpesviruses infect and travel in the mammalian brain. This line of research has been most exciting for me and has provided insight to understanding the functions of the complex glycoproteins of herpesviruses. We are beginning to understand that the CNS responds specifically to neurotropic viruses. In addition, neurotropic viruses show significant promise as tools to study the CNS. Capitalizing on the interaction of neurobiology and virology is now my primary focus.

On October 1, 1993, I accepted the position of Professor of Molecular Biology with tenure at Princeton University where I am studying the molecular mechanisms involved in the infection and spread of neurotropic herpesviruses in the mammalian nervous system.

I believe the cycle is now completed: I've done research in academia - government – biotech- large company- pharmaceutical company and now back to my roots in academia.

### **Current Research Focus: Neurovirology**

Research in my laboratory centers on the molecular biology of neurotropic herpesviruses. Despite having a broad host range and ability to infect many cell types, these viruses invariably infect neurons in the periphery and travel inside neurons to sensory ganglia where they establish either a productive or nonproductive (latent) infection. Occasionally, they reach the central nervous system where they cause a disastrous brain infection. While primary infections can often be serious, the recurrent infections or reactivation from latency are a unique feature of the alpha herpesviruses.

The lab's objectives are to understand the molecular mechanisms of herpesvirus neurotropism and spread in the mammalian nervous system. In addition, we seek to understand how the mammalian nervous system responds to neurotropic virus infections. These objectives are studied in the context of two general approaches: 1) the genetics and molecular biology of viral genes that affect virus attachment, entry, intraneuronal movement, virion assembly, transsynaptic passage and virulence and 2) the use of neurotropic viruses as tools to study the mammalian nervous system. In particular we are using these viruses as tracers of neural connections in the rat brain and in developing chick embryos.

The lab works primarily with mammalian alpha herpesviruses including Pseudorabies virus (PRV), Bovine Herpes Virus (BHV), Varicella Zoster Virus (VZV) and Herpes Simplex Virus (HSV). We often concentrate on PRV because it is a non-human pathogen that grows very well in the lab and infects many animals including rodents and chick embryos.

PRV is a complicated virus whose specific neurotropism and virulence are understood only in principle. The molecular basis for almost all aspects of CNS infection by PRV elude us and many observations remain to be explained. Many of the genes carried by the virus have no function in tissue culture and therefore must function in intact animals. We cannot apply reductionist molecular biology thinking until we develop phenotypes for these genes in the animal. Nevertheless, the ability to create a genetically defined, localized infections in the mammalian CNS provides a unique window to the molecular interactions of a neurotropic parasite and its host.

See lab web page: <http://www.molbio1.princeton.edu/labs/enquist/>

### **Business and Management Experience**

Molecular Genetics, Inc. Responsibility: Research Director and member of the management team that ran the company. I was involved in setting up the company in its very early days; I was the first Research Director. At its peak, I was responsible for approximately 80 people, 22 PhDs and the remainder technical or support personnel. Many technologies had to be established including oligonucleotide synthesis, peptide and protein chemistry, immunology, computer analysis, service and support systems, indoor plant growth rooms, animal facilities etc. Our research programs included animal virus vaccine projects and corn tissue culture projects. I assisted in setting up cost accounting systems, data organization systems, biosafety and safety procedures, laboratory design and planning, interactions with the local community (biotechnology was somewhat controversial in 1981), and helped develop and implement a system of titles, performance rating and salary administration. The general business duties included project management, contract compliance, dealing with stock holders,



managing a research budget that approached 13 million per year at the peak and dealing with general issues of a small entrepreneurial company. I participated in two public stock offerings, an R&D limited partnership and several multi-million dollar contracts with large international companies including American Cyanamid and Martin Marietta. We participated in a unique joint program with Chiron and Native Plants directed by Martin Marietta. I supervised two postdocs and directed a program on herpesvirus glycoproteins/subunit vaccines.

Du Pont and DuPont-Merck Pharmaceutical Company: In 1984, I was appointed as a Research Leader in Molecular Biology, DuPont Central Research and Development (CR&D), Experimental Station. I was on the senior staff of the Molecular Biology group with Du Pont CR&D. I established the Molecular Genetics group that ultimately had 6 principle investigators and a size of 25 people. I ran my own research program consisting of two Scientists and two postdoctoral fellows. In January 1, 1991, I became one of three managers on the senior staff of the Viral Diseases Research group, DuPont Merck Pharmaceuticals. I had line management responsibility for seven Principal Investigators (Ph.D. level) and their staff. An administrative assistant and a lab manager also reported to me. We functioned as a small department with each Ph.D. running a small group with his/her own projects. In total I was responsible for about 25 people and a budget of more than 3 million dollars. My own research group consisted of two professional research technicians and two postdoctoral fellows. In addition to running my laboratory and administering the Molecular Virology group, I also was the Program Coordinator for the Du Pont Merck Postdoctoral Fellowship Program. I shared responsibility for conceiving and implementing the program. When I left, the Company supported 71 postdocs with this program. My responsibilities in the program included managing more than 3 million dollars in funds, supervising an administrative assistant and a clerical worker. In September 1991, I was given the title of Senior Research Fellow which enabled me (theoretically) to devote most of my time to research. I reduced some of my management duties except for running the Postdoc Program and devoted most of my time to running a research effort in developing neurotropic viruses as tools and therapeutic agents for CNS diseases.

I was active in internal administration as a scientific advisor to the senior management. This gave me contact and experience with the broad technology base in DuPont Merck Pharmaceuticals. Before the joint venture, I had been active in consulting activities with the Medical Products department including participating in their extensive strategic planning process in 1984 and 1988-89 where I was member of the Infectious Disease team. The Viral Diseases Research group was created in 1989 and I participated in extensive strategic planning sessions for planning of the business and research plan of the group. I was on the scientific advisory board of a joint venture between Applied Biotechnology Inc., Cambridge, Massachusetts and DuPont Medical Products (Oncogenetics Partners). I planned and participated in the building of over 6,000 square feet of molecular biology laboratories during establishment of my group. This included a virology containment suite for biosafety level three experiments. I was on a team that planned a transgenic and virus-infected animal facility for the Viral Diseases Group. I was chairman of the Experimental Station Site Biosafety Committee and chairman of the 1989 annual DuPont Life Sciences retreat. I was the liaison person for five years in DuPont CR&D for the Corporate Sponsor Program at Cold Spring Harbor Laboratories. I participated in many company sponsored programs, retreats, conferences and courses for career and professional advancement. I maintained an active professional life outside DuPont with appointments at local universities, service on NIH study sections, professional meeting planning committees, session chairman and advisory panels.

In 2004 I became chairman of the Molecular Biology Department at Princeton University. As of June 30, 2009, the Department included 21 professors, 10 assistant professors, 6 associate professors, 13 associated faculty, 2 senior lecturers, 6 lecturers, and 3 emeritus faculty. We employ 64 research staff members and 37 administrative staff in support of 112 undergraduates, 146 graduate students, and 94 fellows/postdocs. In total there are 514 people occupying space 5 buildings.

## PATENTS

1. U.S. Patent No. 4,673,641. Co-aggregate Purification of Proteins. H. T. George, R. A. Kryzyk, **L. W. Enquist** and R. J. Watson.
2. U.S. Patent No. 4,818,694. Production of Herpes Simplex Viral Protein. R. J. Watson, J. H. Weis and **L. W. Enquist**.
3. U.S. Patent No. 4,891,315. Production of Herpes Simplex Viral Proteins. R. J. Watson, J.H. Weis and **L. W. Enquist**.
3. U. S. Patent No. 5,004,693. Pseudorabies Virus Recombinants and Their Use in the Production of Proteins, **A. L. W. Enquist**, A. K. Robbins and M. E. Whealy.
4. U.S. Patent No. 5,037,742. Pseudorabies Virus Recombinants and Their Use in the Production of Proteins, **B. L. W. Enquist**, A. K. Robbins and M. E. Whealy.

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209. Braz JM, **L.W. Enquist** and A.I. Basbaum. Inputs to Serotonergic Neurons Revealed by Conditional Viral Transneuronal Tracing. *J. Comp. Neurol.*, 514:145-160, 2009.
210. **Enquist, L.W.** for the Editors of the *Journal of Virology*. Virology in the 21<sup>st</sup> Century. *J. Virol.*, 83(11):5296-5308, 2009.
211. Lyman M.G., C.D. Kemp, M.P. Taylor and **L.W. Enquist**. A Comparison of the Pseudorabies Virus Us9 With Homologs From Other Veterinary and Human Alphaherpesviruses. *J. Virol.*, 83(14):6978-6986, 2009.
212. Curanovic, D., T.H. Ch'ng, M. Szpara and **L.W. Enquist**. Compartmented neuron cultures for directional infection by alpha herpesviruses. *Curr. Prot. Cell Biol.*, 43:26.4.1-26.4.23, 2009.
213. Curanovic, D. and **L.W. Enquist**. Virion-incorporated glycoprotein B mediates transneuronal spread of pseudorabies virus. *J. Virol.*, 83(16):7796-7804, 2009.
214. Ludmir, E.B. and **L.W. Enquist**. Viral genomes are part of the phylogenetic tree of life. *Nat. Rev. Microbiol.*, 7(8):615, 2009.
215. Granstedt, A.E., M.L. Szpara, B. Kuhn, S.S. Wang and **L.W. Enquist**. Fluorescence-based monitoring of in vivo neural activity using a circuit-tracing pseudorabies virus. *PLoS One*. 4(9):e6923, 2009.
216. McCarthy, K.M., D.W. Tank and **L.W. Enquist**. Pseudorabies Virus Infection Alters Neuronal Activity and Connectivity In Vitro. *PLoS Pathogens*. 4(10):31000640, 2009.
217. Curanovic, D. and **L.W. Enquist**. Directional transneuronal spread of  $\alpha$ -herpesvirus infection. *Future Virol.*, 4(6):591-603, 2009.
218. Grandstedt, A.E., Kuhn B., Wang, S.S., **L.W. Enquist**. Calcium imaging of neuronal circuits in vivo using a circuit-tracing pseudorabies virus. *Cold Spring Harb Protoc.*, 4: pdb.prot5410, 2010.
219. Szpara ML, Parson L, **L.W. Enquist**. Sequence variability in clinical and lab isolates of Herpes Simplex Virus 1 reveals new mutations. *J. Virol.* May; 84(10):5303-13, 2010.
220. Szpara ML, Kobiler O, **L.W. Enquist**. A Common Neuronal Response to Alphaherpesvirus Infection. *J Neuroimmune Pharmacol.* Sep;5(3):418-27, 2010.
221. Kobiler O, Lipman Y, Therkelsen K, Daubechies I, **L.W. Enquist**. Herpesviruses carrying a Brainbow cassette reveal replication and expression of limited numbers of incoming genomes. *Nat Commun.* Dec;1(9):146, 2010.
222. Card JP, Kobiler O, McCambridge J, Ebdlahad S, Shan Z, Raizada MK, Sved AF, **L.W. Enquist**. Microdissection of neural networks by conditional reporter expression from a Brainbow herpesvirus. *Proc Natl Acad Sci USA*. 2011 Feb 22;108(8):3377-82.
223. Taylor MP, Koyuncu OO, **L.W. Enquist**. Subversion of the actin cytoskeleton during viral infection. *Nat Rev Microbiol.* 2011 Jun;9(6):427-39. Epub 2011 Apr 27.
224. Kramer T, Greco TM, **L.W. Enquist**, Cristea IM. Proteomic Characterization of Pseudorabies Virus Extracellular Virions. *J. Virol.* 2011 Jul;85(13):6427-41. Epub 2011 Apr 27.
225. Haugo AC, Szpara ML, Parsons L, **L.W. Enquist**, Roller RJ. Herpes simplex virus type 1 pUL34 plays a critical role in cell-to-cell spread of virus in addition to its role in virus replication. *J Virol.* 2011 Jul;85(14):7203-15. Epub 2011 May 11.
226. Card JP, Kobiler O, Ludmir EB, Desai V, Sved AF, **L.W. Enquist**. A dual infection pseudorabies virus conditional reporter approach to identify projections to collateralized neurons in complex neural circuits. *PLoS One*. 2011;6(6):e21141. Epub 2011 Jun 16.
227. Szpara ML, Tafuri YR, **L.W. Enquist**. Preparation of viral DNA from nucleocapsids. *J Vis Exp*. 2011 Aug 16;(54). pii: 3151. doi: 10.3791/3151.
228. Szpara ML, Tafuri YR, Parsons L, Shamim SR, Verstrepen KJ, Legendre M, **L.W. Enquist**. A wide extent of inter-strain diversity in virulent and vaccine strains of alphaherpesviruses. *PLoS Pathog.* 2011 Oct;7(10):e1002282. Epub 2011 Oct 13.
229. Kobiler O, Brodersen P, Taylor MP, Ludmir EB, **L.W. Enquist**. Herpesvirus replication compartments originate with single incoming viral genomes. *MBio*. 2011 Dec 20;2(6). pii: e00278-11. doi: 10.1128/mBio.00278-11. Print 2011.
230. **L.W. Enquist**. Select agent publications and the H5N1 influenza virus controversy: a Journal of Virology Perspective. *J Virol.* 2012 Apr;86(7):3410. Epub 2012 Jan 26.
231. Berns KI, Casadevall A, Cohen ML, Ehrlich SA, **L.W. Enquist**, Fitch JP, Franz DR, Fraser-Liggett CM, Grant CM, Imperiale MJ, Kanabrocki J, Keim PS, Lemon SM, Levy SB, Lumpkin JR, Miller JF, Murch R, Nance ME,

- Osterholm MT, Relman DA, Roth JA, Vidaver AK. Policy: Adaptations of avian flu virus are a cause for concern. *Nature*. 2012 Jan 31;482(7384):153-4.
232. Berns KI, Casadevall A, Cohen ML, Ehrlich SA, **L.W. Enquist**, Fitch JP, Franz DR, Fraser-Liggett CM, Grant CM, Imperiale MJ, Kanabrocki J, Keim PS, Lemon SM, Levy SB, Lumpkin JR, Miller JF, Murch R, Nance ME, Osterholm MT, Relman DA, Roth JA, Vidaver AK. Public health and biosecurity. Adaptations of avian flu virus are a cause for concern. *Science*. 2012 Feb 10;335(6069):660-1. Epub 2012 Jan 31.
  233. **L.W. Enquist**. Five Questions about Viral Trafficking in Neurons. *PLoS Pathog*. 2012 Feb;8(2):e1002472. Epub 2012 Feb 16.
  234. Taylor MP, Kramer T, Lyman MG, Kratchmarov R, **L.W. Enquist**. Visualization of an Alphaherpesvirus Membrane Protein That Is Essential for Anterograde Axonal Spread of Infection in Neurons. *mBio* 2012 May 2:3(2). pii: e00063-12. doi: 10.1128/mBio.00063-12. Print 2012.
  235. Kramer T, **L.W. Enquist**. Alphaherpesvirus infection disrupts mitochondrial transport in neurons. *Cell Host Microbe*. 2012 May 17;11(5):504-14.
  236. Kratchmarov R, Taylor MP, **L.W. Enquist**. Making the case: Married versus Separate models of alphaherpes virus anterograde transport in axons. *Rev Med Virol*. 2012 Jul 16:1-12. doi: 10.1002/rmv.1724.
  237. Card J. Patrick, **Enquist Lynn W**. "Use and Visualization of Neuroanatomical Viral Transneuronal Tracers." Visualization Techniques: From Immunohistochemistry to Magnetic Resonance Imaging. Ed Emilio Badoer. *Neuromethods*, vol. 70, 2012, 225-268.
  238. Taylor MP, Kobiler O, **L.W. Enquist**. Alphaherpesvirus axon-to-cell spread involves limited virion transmission. *Proc Natl Acad Sci USA*. 2012 Oct 16;109(42):17046-17051.
  239. Koyuncu OO, Perlman DH, **L.W. Enquist**. Efficient Retrograde Transport of Pseudorabies Virus within Neurons Requires Local Protein Synthesis in Axons. *Cell Host & Microbe*, Volume 13, Issue 1, 54-66, 16 January 2013.
  240. Kramer T, **L.W. Enquist**. Directional Spread of Alphaherpesviruses in the Nervous System. *Viruses* 2013, 5, 678-707.
  241. Kratchmarov R, Taylor MP, **L.W. Enquist**. (2013) Role of Us9 Phosphorylation in Axonal Sorting and Anterograde Transport of Pseudorabies Virus. *PLoS One*.2013;8(3):e58776. Epub 2013 Mar 19.
  242. Koyuncu OO, Hogue IB, **L.W. Enquist**. Virus infections in the nervous system. *Cell Host Microbe*. 2013 Apr 17;13(4):379-93.
  243. Granstedt AE, Brunton BW, **L.W. Enquist**. Imaging the Transport Dynamics of Single Alphaherpesvirus Particles in Intact Peripheral Nervous System Explants from Infected Mice. *MBio*. 2013 June 4;4(3).
  244. Kratchmarov R, Kramer T, Greco TM, Taylor MP, Ch'ng TH, Cristea IM, **L.W. Enquist**. Glycoproteins gE and gI are required for efficient KIF1A-dependent anterograde axonal transport of alphaherpesvirus particles in neurons. *J Virol*. 2013 Jun 26.
  245. Sun XR, Badura A, Pacheco DA, Lynch LA, Schneider ER, Taylor MP, Hogue IB, **L.W. Enquist**, Murthy M, Wang SS. Fast GCaMPs for improved tracking of neuronal activity. *Nat Commun*. 2013 Jul 17;4:2170.
  246. Taylor MP, Kratchmarov R, **L.W. Enquist**. Live Cell Imaging of Alphaherpes Virus Anterograde Transport and Spread. *J. Vis. Exp.* (78), e50723, doi:10.3791/50723 (2013).
  247. Szpara ML, Gatherer D, Ochoa A, Greenbaum B, Dolan A, Bowden RJ, **L.W. Enquist**, Legendre M, Davison AJ. Evolution and diversity in human herpes simplex virus genomes. *J Virol*. 2014 Jan;88(2):1209-27. Epub 2013 Nov 13.
  248. Wojaczynski GJ, Engel EA, Steren KE, **L.W. Enquist**, Card JP. The neuroinvasive profiles of H129 (herpes simplex virus type 1) recombinants with putative anterograde-only transneuronal spread properties. *Brain Struct Funct*. Epub 2014 Mar 2.

#### PRESENTATIONS AT NATIONAL AND INTERNATIONAL MEETINGS, AND PUBLIC SEMINARS

1. American Society for Microbiology
  - 1968 – Detroit, Michigan
  - 1969 – Miami, Florida
  - 1970 – Boston, Massachusetts
  - 1971 – Minneapolis, Minnesota

- 1972 – Philadelphia, Pennsylvania
  - 1980 – Miami, Florida
  - 1982 – Atlanta, Georgia
  - 1984 – St. Louis, Missouri
  - 1987 – Atlanta, Georgia
  - 1993 – Atlanta, Georgia
  - 1994 – Las Vegas, Nevada
  - 1995 – Washington, DC
  - 1999 – Chicago, Illinois
  - 2001 – Orlando, Florida
2. Federation Meetings
    - 1972 - Atlantic City, New Jersey
  3. Society for Cell Biology
    - 1969 - Boston, Massachusetts
  4. Society for Industrial Microbiology
    - 1969 - University of Western Ontario, London, Ontario
    - 1970 - University of Rhode Island, Kingston, Rhode Island
  5. Society for Developmental Biology
    - 1972 - Wesleyan University, Middletown, Connecticut
  6. ICN-UCLA Virus Research Symposium
    - 1973 - Squaw Valley, California
  7. EMBO Workshop on Comparative Aspects of Lysogeny
    - 1973 - Stockholm, Sweden
  8. Roche Symposium on Genetic Recombination
    - 1973 - Nutley, New Jersey
  9. Cold Spring Harbor Lysogenic Phage Meeting
    - 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1979
  10. Oak Ridge National Laboratory Symposium on Mechanisms in Recombination
    - 1974 - Gatlinburg, Tennessee
  11. International Conference on the Biology of Temperate Bacteriophage
    - 1975 - Airle House, Warrenton, Virginia
  12. Joint Japanese-American Symposium on Replication and Recombination of Lambdoid Phages
    - 1976 - Cold Spring Harbor, New York
  13. DNA Insertion Meeting ("McClintock Transposition Symposium")
    - 1976 - Cold Spring Harbor, New York
  14. Miami Winter Symposium:
    - 1977 - Miami, Florida
    - 1982 - Miami, Florida
    - 1988 - Miami, Florida
  15. EMBO Workshop on Recombination
    - 1977 - Nethybridge, Scotland
    - 1979 - Nethybridge, Scotland
  16. Mid-Atlantic Plasmid Conference
    - 1977 - Skyland Lodge, Virginia
  17. 43rd Annual Cold Spring Harbor Symposium: DNA Replication and Recombination
    - 1978 - Cold Spring Harbor, New York
  18. Ohio State University Biological Science Colloquium: Gene Structure and Function.
    - 1979 - Columbus, Ohio
  19. EMBO Workshop - Protein DNA Interactions in Bacteriophages
    - 1980 - Salamanca, Spain
  20. Joint USA-USSR Conference on Genetics of Actinomycetes
    - 1980 - Yalta, Crimea, USSR
  21. Recombinant DNA Team for NIH-India
    - 1982 - New Delhi, Bombay, Bangalor
  22. US-Japan Cooperative Program for Recombinant DNA Research:
    - Workshop on Medical Applications.
    - 1983 – Honolulu Hawaii

23. 33rd Symposium on the Biology of Skin: Cutaneous Oncogenic Viruses  
1983 - Gleneden Beach, Oregon
24. 3rd Annual Queen's University Symposium: Gene Expression.  
1983 - Queen's University, Kingston, Ontario
25. Symposium on the Establishment of the Pacific International  
Center for High Technology Research.  
1983 - Honolulu, Hawaii
26. 71st Conference for Veterinarians and Alumni Reunion.  
1983 - Purdue University, West Lafayette, Indiana
27. Public Lecture Series; The Biotechnology Revolution.  
1984 - Emory University (invited)  
(Talk: The Revolution in Agriculture)
28. Public Lecture. Biotechnology. Reflective Leadership Seminar;  
1984 - Hubert H. Humphrey Institute of Public Affairs, Minneapolis, Minnesota
29. Public Lecture. Commercializing Biotechnology. National Conference of Venture Capitalists.  
1984 - Peat, Marwich and Mitchell Co., Minneapolis, Minnesota
30. Public Lecture. Biosynthesis of Herpes Simplex Antigens in *E. coli*.  
1984 - Virginia Commonwealth University. Distinguished Alumnus Seminar
31. Public Lecture. Biotechnology and Agriculture.  
1984 - South Dakota State University. 1984 Distinguished Alumnus Seminar.
32. Joint China-US - Scientific Exchange.  
1985 - Shanghai, Wuxi, Yangzhou, Nanjing and Beijing.
33. Protein Secretion Meeting - Woods Hole, Massachusetts, 1986
34. International Herpesvirus Workshops: every year since 1986.
35. Virus and the Brain - Iceland, 1989
36. Modern Approaches to Vaccines - Cold Spring Harbor, 1989.
37. Winter Conference on Brain Research  
- Vail, Colorado, 1991 .  
- Steamboat Springs, Colorado, 1992.  
- Whistler, British Columbia, Canada, 1993.  
- Snowbird, Utah, 1994.  
- Snowmass, Colorado, 1996, 2002
38. Banbury Conference on Virus Receptors - Cold Spring Harbor, 1991.
39. FASEB Summer Conference on Virus Assembly - Saxtons River, Vermont. 1992, 2000, 2002, 2007.
40. Howard Hughes Medical Institute Lecture on Biosafety - Washington D. C. 1992.
41. Gordon Conference, Animal Cells and Viruses - Tilton School, New Hampshire.  
1993, 1995, 1997, 1999 (Italy), 2001 vice-chair, 2003 (Italy) chair, 2005 (Italy), 2009 (Italy), 2010 (Italy), 2011  
discussion leader (Italy)
42. University of Wales College of Cardiff Symposium on Gene Transfer into Neurons. 1993.
43. Society for Neuroscience  
- Anaheim CA, 1993  
- Washington DC, 1994
44. American Society for Virology  
- Symposium Speaker, Austin Texas, July 1995.  
- Plenary Speaker, UC Davis California, 2003.  
- Symposium Speaker, University of Wisconsin-Madison, 2006.
45. FASEB Summer Conference on Neuroimmune Interactions - Copper Mt. Colorado. 1996.
46. 6th International CMV Workshop. Invited speaker. March 5-9, 1997. Perdido Beach, Alabama.
47. Lecturer, University of Lyon, France. February 17-19, 1997.
48. The Subak-Sharpe Lecture, 22 International Herpesvirus Workshop, San Diego 1997.
49. Buffalo Conference on Microbial Pathogenesis. SUNY Buffalo, New York, April 22, 1997.
50. Viral Infections in the CNS: mechanisms of action and use in defining neural circuits. Atlanta, Ga. 1997.
51. Symposium. Virus Group of the Society for General Microbiology in the UK and Irish Group on Microbial  
Neuropathogenesis, Belfast, Northern Ireland. 2- 4<sup>th</sup> Sept 1998
52. Symposium: One hundred years of virology - past, present and future of virus research. Greifswald, Germany, June 25-  
27, 1998.
53. Symposium. A Cell Biology Approach to Microbial Pathogenesis. ASM. Portland Oregon. 1999
54. Third International Symposium. PRRS-Aujesky's Disease. Ploufragan, France. 1999

55. Division S Lecture at the 99<sup>th</sup> ASM General Meeting. Chicago, Illinois. 1999.
56. Invited Speaker, FASEB Summer Conference on Viral Pathogenesis - Snowmass, Colorado. 2000
57. Invited Speaker, 10<sup>th</sup> International Conference on Immunobiology and Prophylaxis of Human Herpesvirus Infections. Osaka, Japan 2001
58. Invited Speaker, European Society for Veterinary Virology Herpesvirus Symposium, Zurich, 2001.
59. Invited Speaker, Annual Meeting of the German Society of Virology, Erlangen, 2002
60. Invited Speaker, 6<sup>th</sup> Annual Meeting of the American Society of Gene Therapy, Washington DC, 2003.
61. Plenary Speaker, European Society for Veterinary Virology, St. Malo, 2003
62. Invited Speaker, 11<sup>th</sup> International Conference on Immunobiology and prophylaxis of Human Herpesvirus Infections. Taromina, Italy 2003.
63. Scientific Guest, Sun Yat-sen University, China, 2004.
64. Invited Speaker, 2<sup>nd</sup> Veterinary Herpesvirus Symposium, Ghent Belgium, 2005.
65. Invited Speaker, Symposium on Mechanisms of cellular compartmentalization, Marburg Germany, 2005
66. Invited Speaker, Cold Spring Harbor Conference, Imaging Neurons and neural activity: new methods, new results. CSH New York, 2005.
67. Invited Speaker, 8<sup>th</sup> Annual Conference on New and Re-emerging Infectious Diseases, University of Illinois at Urbana, 2005.
68. Invited Speaker, XIIIth International Congress of Virology-IUMS, San Francisco, 2005.
69. Invited Speaker, International Symposium on Molecular Bases Underlying Microbial Infections and the Host Responses, National Center of Sciences, Tokyo Japan, 2005.
70. Invited Speaker, Imaging Neurons and Neural Activity: New Methods, New Results, Cold Spring Harbor NY, 2005.
71. Invited Speaker, Frank N. Nelson Distinguished Lecture Series, Montana State University Bozeman, 2005.
72. Invited Speaker, Mechanisms of Cellular Compartmentalization Symposium, Marburg Germany, 2005.
73. Invited Speaker, International Conference on the Immunobiology and Prophylaxis of Human Herpesvirus Infections, Osaka Japan, 2005.
74. Invited Speaker, Neural Circuit Series, Friedrich Miescher Institute for Biomedical Research, Basel Switzerland, 2006.
75. Plenary Speaker, Glasgow Virology Workshop, Glasgow Scotland, 2006.
76. Keynote Speaker, 9<sup>th</sup> Southeastern Regional Virology Conference, Atlanta Georgia, 2006
77. Invited Speaker, Graduate Student Seminar Series, Case Western Reserve University, Cleveland Ohio, 2006.
78. Keynote Lecture, 2<sup>nd</sup> Annual Institute for Molecular Virology Symposium, Minneapolis Minnesota, 2006.
79. Invited Speaker, Mayo Clinic, Rochester Minnesota, 2006.
80. Invited Speaker, Monday Research Seminars, Nemours Biomedical Research, Wilmington Delaware, 2006.
81. Invited Speaker, Drexel University College of Medicine, Philadelphia Pennsylvania, 2006.
82. Invited Speaker, Pasteur Institute, Paris France, 2006.
83. Keynote Speaker, 4<sup>th</sup> International Workshop on the Mol. Pathogenesis of Mark's Disease, University of Delaware, 2006.
84. Invited Speaker, The Axonal Dynamics and Synaptic Junctions Meeting, Banbury Center, Cold Spring Harbor New York, 2006.
85. Invited Speaker, Janelia Farms Neural Identity Meeting, Ashburn Virginia, 2007
86. Seminar, University of Western Ontario, London Ontario Canada, 2007
87. Virology Course Lecture, The Rockefeller University, New York, 2007, 2009
88. Seminar, University of Massachusetts Medical School, Worcester Massachusetts, 2007
89. Lecture, RCE/Lamb Seminar Series Vanderbilt University, Nashville Tennessee, 2007
90. Seminar, New York Academy of Sciences, New York, 2007
91. Seminar, Thomas Jefferson University, Philadelphia, 2007
92. Keynote Speaker, International Virology Conference, Wuhan China, 2007
93. Lectures in Virology; U. Hong Kong/Institute Pasteur, Hong Kong, 2009
94. Invited Speaker, University of California, Berkeley, California, 2009
95. Invited Speaker, Fred Hutchinson Cancer Research Center, Seattle, Washington, 2009
96. Invited Speaker, University of Texas – Southwestern, Dallas, Texas 2009
97. Invited Speaker, University of North Carolina – Chapel Hill, North Carolina, 2009
98. Invited Speaker, Harvard Medical School, Boston, Massachusetts, 2009
99. Invited Speaker, Washington University, St. Louis, Missouri, 2009
100. Invited Speaker, Neurotropic Viruses, University of Hong Kong Pasteur Research Center, Pokfulam, Hong Kong, 2009
101. Chair, Veterinary herpesviruses Satellite Workshop, IHW, Cornell University, New York, 2009
102. Invited Speaker, University of Alberta, Edmonton, Canada, 2009
103. Keynote Speaker, Symposium on Virus-Host Interaction, Mount Sinai School of Medicine, New York, NY, 2009.
104. Lecture, European Society for Virology - Virus Cell Interplay, Cernobbio, Italy, 2010
105. Lecture, Institute of Virology, Rebirth Programme, Hannover Medical School, Hannover, Germany, 2010

106. Invited Speaker, FMI Seminar, Friedrich Miescher Institute for Biomedical Research, Basel, Switzerland, 2010
107. Invited Speaker, American Society for Gene & Cell Therapy Annual Meeting, Washington, DC, 2010
108. Invited Speaker, EMBO Workshop – Emerging Themes in Infection Biology, Nice, France, 2010
109. American Society for Virology Education Workshop, Montana State University, Bozeman, Montana, 2010
110. Invited Speaker, Nebraska Center for Virology Symposium, University of Nebraska, Lincoln, Nebraska, 2010
111. Invited Speaker, Columbia University, New York City, 2010
112. Invited Speaker, International Assoc of Neuroinfection Studies meeting, Saint Denis, Reunion Island, 2010
113. Invited Speaker, Van Andel Research Institute, Grand Rapids, Michigan, 2011
114. Invited Speaker, Yale University, New Haven, Connecticut, 2011
115. Invited Speaker, Institut Pasteur, Paris, France, 2011
116. Invited Speaker, Indiana University, Bloomington, Indiana, 2011
117. Invited Speaker, Stanford University School of Medicine, Stanford, California, 2011
118. Invited Speaker, British-Scandinavian Meeting in Microbiology & Infection, Bergen, Norway, 2011
119. Invited Speaker, University of Florida, Gainesville, Florida, 2011
120. Lecture, Circuits & Connectivity in the Vertebrate Brain, Cold Spring Harbor Lab, New York, 2011
121. Invited Speaker, Medical Sciences Congress Meeting, Queenstown, New Zealand, 2011
122. Invited Speaker, University of Richmond, Richmond, Virginia, 2012
123. Invited Speaker, University of Michigan, Ann Arbor, Michigan, 2012
124. Invited Speaker, University of Arizona, Tucson, Arizona, 2012
125. Lecture, National Institute of Neurological Disorders and Stroke, Bethesda, Maryland, 2012
126. Invited Speaker, Dutch Annual Virology Symposium, Royal Netherlands Academy of Arts and Sciences, Amsterdam, Netherlands, 2012
127. Invited Speaker, Brain Connectivity Workshop, The Chinese Academy of Sciences, Beijing, China, 2012
128. Invited Speaker, Sun Yat-Sen University Cancer Center, Guangzhou, China, 2012.
129. Keynote Speaker, Drexel University College of Medicine, Discovery 2012, Philadelphia, Pennsylvania
130. Invited Speaker, ASM General Meeting Special Session, San Francisco, California, 2012
131. Invited Speaker, University of Pennsylvania, Neurovirology Symposium, Philadelphia, Pennsylvania, 2012
132. Invited Speaker, Swiss Academic Foundation for Education in Infectious Disease, Challenge in Virology, Bern Switzerland, 2013
133. Invited Speaker, University of Zurich, ESVV Veterinary Herpesvirus Symposium, Zurich, Switzerland, 2013
134. Invited Speaker, University of Pennsylvania, Microbiology Seminar, Philadelphia, Pennsylvania, 2013
135. Invited Speaker, Zhejiang University School of Medicine, Hangzhou, China, 2013
136. Invited Speaker, Eastern Virginia Medical School, Herpesvirus Symposium, Norfolk, Virginia, 2013
137. Invited Speaker, Yale University, Microbiology Seminar, New Haven, Connecticut, 2013
138. Invited Speaker, Colorado Alphaherpesvirus Latency Symposium, Vail, Colorado, 2013
139. Invited Speaker, Rockefeller University Virology Seminar, New York City, New York, 2013
140. Keynote Speaker, ASV Symposium, Pennsylvania State University, State College, Pennsylvania, 2013
141. Invited Speaker, Baylor College of Medicine Seminar, Houston, Texas 2013
142. Invited Speaker, Queens University, London Ontario, Canada, 2014
143. Invited Speaker, Virology Seminar, Harvard University, Boston, Massachusetts, 2014
144. Guest Lecturer, Zhejiang University School of Medicine, Hongzhou, China, 2014
145. Invited Speaker, Keystone Symposia, Breckenridge, Colorado, 2014
146. Guest Fellow, University of Otago, Dunedin, New Zealand, 2014
147. Invited Speaker, Molecular and Cellular Biology Seminar, Dartmouth, Hanover, New Hampshire, 2014
148. Invited Speaker, Neuroscience Seminar, Temple University, Philadelphia, Pennsylvania, 2014