

Curriculum Vitae

**Craig Eugene Cameron**



Professor of Biochemistry and Molecular Biology  
Holder of the Eberly Family Chair in Biochemistry and Molecular Biology  
Department of Biochemistry and Molecular Biology  
The Pennsylvania State University  
201 Althouse Laboratory  
University Park, PA 16802  
(814) 863-8705 (office)  
(814) 876-8705 (cell)  
(814) 863-7024 (fax)  
cec9@psu.edu (e-mail)

**Education:**

- May 1987     B.S., *magna cum laude*, Chemistry (major) and Mathematics (minor), Howard University, Washington, DC
- Jan. 1993     Ph.D., Biochemistry, Case Western Reserve University School of Medicine, Cleveland, OH

**Professional Experience:**

- Feb. 2015 – present     Member, Molecular Carcinogenesis Program, Penn State Hershey Cancer Institute
- Jan. 2011 – Dec. 2012     Associate Head for Research and Graduate Education, Department of Biochemistry and Molecular Biology, The Pennsylvania State University
- Jul. 2005 – present     Professor, Department of Biochemistry and Molecular Biology, The Pennsylvania State University
- Jan. 2007 – present     Member, Training Faculty, Penn State MD-PhD Program, Penn State College of Medicine
- Jul. 2002 – Jun. 2005     Associate Professor, Department of Biochemistry and Molecular Biology, The Pennsylvania State University
- Aug. 1997 – Jun. 2002     Assistant Professor, Department of Biochemistry and Molecular Biology, The Pennsylvania State University
- Aug. 1997 – present     Member, Graduate Program Faculty, Huck Institutes of the Life Sciences, The Pennsylvania State University
- Aug. 1997 – Jun. 2010     Member, Center for Biomolecular Structure and Function, The Pennsylvania State University

- Aug. 1997 – Jun. 2003      Member, NSF Research Training Program: Microbial Structural Biology, The Pennsylvania State University
- Aug. 1997 – Dec. 2006      Member, Option in Chemical Biology Huck Institute for Life Sciences, The Pennsylvania State University
- Jan. 1994 – Aug. 1997      NIH postdoctoral fellow in the laboratory of Dr. Stephen J. Benkovic, Department of Chemistry, The Pennsylvania State University Mechanism of strand transfer reactions catalyzed by retroviral reverse transcriptases; “dynamics-function” relationships of dihydrofolate reductase; biochemical and molecular genetic analysis of amino-imidazole-carboxamide ribotide transformylase/inosine monophosphate cyclohydrolase.
- 1993                              Postdoctoral fellow in the laboratory of Dr. Jonathan P. Leis, Department of Biochemistry, Case Western Reserve University School of Medicine Intracellular regulation of Rous sarcoma virus protease activity.
- Aug. 1988 – Dec. 1992      NIH (MARC) predoctoral fellow in the laboratory of Dr. Jonathan P. Leis, Department of Biochemistry, Case Western Reserve University School of Medicine. Structure-function studies of the retroviral protease.

**Research Interests:**

RNA Polymerases and RNA-binding Proteins in Viral Infection and Mitochondrial Disease

Since its inception, the primary goal of this laboratory has been development of strategies to treat or to prevent infections by RNA viruses. We have used poliovirus and hepatitis C virus (HCV) as our primary model systems. Our expertise in virology, biochemistry and mechanistic enzymology brings a unique combination of intellectual and technical resources to the study of RNA viruses. Our initial focus was the viral RNA-dependent RNA polymerase (RdRp). In particular, we were interested in the kinetic, thermodynamic and structural basis for fidelity of nucleotide incorporation, a topic of considerable importance not only for accurate maintenance, transmission and expression of genetically encoded information but also for targeting the RdRp for antiviral therapy. These studies have led to exciting discoveries that have moved the lab into many new areas, including enzyme dynamics, vesicular trafficking, innate immunity, vaccine development and mitochondrial molecular biology. Our work is highly collaborative and includes research teams from academia (local, national and international), government and industry. We currently have projects in the following areas: RNA-dependent RNA polymerase mechanism, Picornavirus genome replication, Flavivirus genome replication, Enzymology of the flavivirus replicase, and Mitochondrial transcription and disease.

**Honors and Awards:**

- NIH R37 MERIT Award (2018-2028)  
Fellow, American Academy of Microbiology (2016)  
Fellow, American Association for the Advancement of Science (2014)  
Special Recognition Award, Medical Alumni Board, CWRU School of Medicine (2014)

Genesis Scholar Award, HBCU Digest (2014)  
Eberly Family Chair in Biochemistry and Molecular Biology (2013-present, PSU)  
Dean's Climate and Diversity Award, Eberly College of Science (2011)  
Distinguished Service Award, Eberly College of Science Alumni Society (2010)  
Fellow, Academic Leadership Program, Committee on Institutional Cooperation (2007-2008)  
Paul Berg Professorship (2005-2010 and 2010-2012, PSU)  
American Heart Association Established Investigator Award (2003-2007)  
Louis Martarano Career Development Professorship (2002-2005, PSU)  
NCI Howard Temin Award (1997-2002)  
NIH Postdoctoral Fellowship (1994-1997)  
Marcus Singer Award for Excellence in Graduate Research (1992, CWRU)  
NIH (MARC) Predoctoral Fellowship (1989-1992)  
Phi Beta Kappa  
Beta Kappa Chi Scientific Honor Society  
Golden Key National Honor Society  
NIH (MARC) Undergraduate Scholarship (1985-1987)  
Howard University Trustee Scholarship (1983-1985)  
Howard University Dean's List (1983-1987)

**Professional Memberships:**

American Association for the Advancement of Science  
American Chemical Society  
American Society for Biochemistry and Molecular Biology  
American Society for Microbiology  
American Society for Virology  
RNA Society

**Inventions and Patents:**

PSU Inv. Dis. No. 99-2100  
Title: RNA-dependent RNA Polymerase Substrates  
Inventors: Cameron and Arnold  
Filed: May 28, 1999

PSU Inv. Dis. No. 2002-2640  
Title: Reagents to Study Hepatitis C Virus NS5a Protein  
Inventors: Cameron  
Filed: May 22, 2002

US Patent Application Serial No.: 60/398,458  
PSU Inv. Dis. No. 2002-2675  
Title: Use of Nucleoside P to Treat Acute and Persistent RNA Virus Infections  
Inventors: Loakes, Brown, Negishi, Moriyama, Balzarini, Cameron, Arnold, Castro, Korneeva, and Graci.  
Filed: September 24, 2002

Patent Application No.: WO/2003/039450

Territories: US (20050043268), EP (EP1441744), JP (2003541742)

PSU Inv. Dis. No. 2002-2675

Title: Improvements in or Relating to Inhibition of Viruses

Inventors: Loakes, Brown, Negishi, Moriyama, Balzarini, Cameron, Arnold, Castro, Korneeva, and Graci.

Filed: May 7, 2004

US Patent Application Serial No.:11/119,587

Title: Compounds and Methods for Inhibiting Hepatitis C Virus Replication

Inventors: Raney, Cameron, Dave, Sakon, Lu, Mackintosh , and Jennings

Filed: May 1, 2005; Issued December 16, 2008 (US 7,465,537)

US Patent Application Serial No.: 60/803,442

PSU Inv. Dis. No. 2006-3199

Title: Indole Nucleosides as Antiviral Agents

Inventors: Petersen and Cameron

Filed: May 30, 2006

PSU Inv. Dis. No. 2007-3400

Title: Analogues of 6-Methyl Purine Ribonucleosides as Antiviral Agents

Inventors: Petersen and Cameron

Filed: December 11, 2007

US Patent Application Serial No.: 11/963,930

Title: "Modified Polymerases and Attenuated Viruses and Methods of use Thereof"

PSU Inv. Disc. No.: 2006-3279

Inventors: Cameron, Arnold and Castro

Filed: December 24, 2007; Issued: March 10, 2010 (US 7,758,868)

US Patent Application Serial No.: 12/686,200

Title: "Attenuated Viruses, Vaccines and Methods of use Thereof"

PSU Inv. Disc. No.: 2006-3279

Inventors: Cameron, Arnold and August

Filed: January 12, 2010

US Provisional Patent Application Serial No.: 62/548,425

Title: Broad Spectrum Viral Inhibitor

PSU Inv. Disc. No.: 2017-4657

Inventors: Almo, Grove, Gizzi, Cameron and Arnold

### **Graduate Students, Postdoctoral Scholars and Research Associates:**

#### Graduate students supervised

<u>Student</u>	<u>Degree/Date</u>
David Gohara	Ph.D./December 2001
Jamie Arnold	Ph.D.(Chemistry)/December 2003
Jungwook Hwang	M.S./August 2005

Harsh Pathak	Ph.D./May 2006
Uzodinma Uche	M.S.(Chemistry)/May 2007
Jason Graci	Ph.D./August 2007
Victoria Korneeva	Ph.D./August 2007
Jungwook Hwang	Ph.D.(Molecular Medicine)/August 2008
Hyung Suk Oh	Ph.D./December 2009
Alex Lugo	M.S.(Molecular Medicine)/August 2011
Daniel Cordek	Ph.D./December 2012
Cheri Lee	Ph.D./August 2015
Sixing Li	Ph.D./December 2015
Yao Wang	M.S./May 2016
Taylor Croom-Preez	Ph.D./August 2016
Sravani Banerjee	Ph.D./December 2017
Djoshkun Shengjuler	Ph.D./August 2017
Henry Hsiung	Ph.D./in progress
Calvin Yeager	Ph.D./in progress
Hyejeong Kim	Ph.D./in progress

Postdoctoral students supervised (Name/Degree/Institution & Date Granted/Period of Training/Current Status)

Lai Wei, M.D., Ph.D. (Beijing Medical University, Beijing, China, 1996)  
July 1998 - August 1999  
Professor and Director, Peking University Hepatology Institute  
Vice President, International Cooperation, Peking University People's Hospital

Elena Sineva, Ph.D. (Bar Ilan University, Ramat Gan, Israel, 2000)  
April 2000 – December 2001  
Assistant Project Scientist II, Skaggs School of Pharmacy and Pharmaceutical Science, UCSD

Suresh Sharma, Ph.D. (University of Mumbai, India, 1999)  
October 2000 – September 2004  
Research Associate, Department of Biochemistry and Molecular Biology, The Pennsylvania State University

Luyun Huang, Ph.D. (SUNY Buffalo, 1999)  
January 2001 – July 2005  
Owner, PhD Translation Limited (Beijing, China)

Christian Castro, Ph.D. (Baylor University, Waco, TX, 2000)  
May 2000 – December 2006  
Senior Research Scientist, Department of Psychiatry, UT Southwestern Medical Center

Miaoqing Shen, Ph.D. (The Pennsylvania State University, University Park, PA)  
August 2003 – December 2005  
Research Associate, Department of Biomedical Sciences, Cornell University

Michele Hargittai, Ph.D. (University of Minnesota, Minneapolis, MN)

November 2001 – August 2007

Assistant Professor, Department of Chemistry, Saint Francis University, Loretto, PA

Qixin Wang, M.D., Ph.D. (Peking University, Beijing, China, 2001)

September 2003 – August 2007

Medical Advisor, Merck, Sharp and Dohme, Beijing, China

Akira Uchida, Ph.D. (Gifu University, Gifu, Japan, 2003)

January 2007 - March 2013

Senior Research Fellow, Nanyang Technological University, Singapore

Maria Fernanda Lodeiro, Ph.D. (University of Buenos Aires, Argentina, 2007)

April 2007 – December 2012

Research Associate, The Pennsylvania State University

Spencer Weeks, Ph.D. (University of Michigan, 2009)

March 2009 – December 2010

Thomas McCrory, Ph.D. (Pennsylvania State University, 2012)

January 2013 – December 2013

Andrew Woodman, Ph.D. (University of Warwick, 2015)

August 2015 – present

Shubeena Chib, Ph.D. (University of Arkansas for Medical Sciences, 2016)

July 2016 – December 2017

Scientist, Genentech, South San Francisco, CA

Wu Liu, Ph.D. (Tsinghua University, Beijing, China, 2015)

July 2016 - present

Markus Kastner, Ph.D. (Institute of Biophysics, Johannes Kepler University, Linz, Austria, 2016)

August 2016 - present

Research associates supervised (Name/Degree/Institution & Date Granted/Period of Training/Current Status)

Jamie Arnold, Ph.D. (The Pennsylvania State University, 2003)

January 2004 – present

Suresh Sharma, Ph.D. (University of Mumbai, Mumbai, India, 1999)

June 2006 - present

Ibrahim Moustafa, Ph.D. (St Andrews University, UK, 2004)

June 2006 - June 2016

Eric Smidansky, D.D.S. (Case Western Reserve University School of Dentistry, 1979)

August 2007 – June 2013

Maria Fernanda Lodeiro, Ph.D. (University of Buenos Aires, Argentina, 2007)

January 2013 – May 2015

**Active Research Support:**

Sponsor: National Institutes of Health; NIAID; R01 AI045818  
Title: “RNA-Dependent RNA Polymerase Mechanism”  
Duration: 07/01/99-04/30/20  
Current Year Direct Costs: \$257,047  
Role (Effort) PI (3.0 months)

Sponsor: National Institutes of Health; NIAID; R01 AI053531  
Title: “Picornavirus Genome Replication”  
Duration: 07/01/03-01/31/23  
Current Year Direct Costs: \$307,321  
Role (Effort) PI (3.0 months)

Sponsor: Human Frontier Science Program Organization  
Title: “Stabilizing RNA virus vaccine strains by elucidating triggers and mechanisms of recombination”  
Duration: 01/01/15-12/31/18  
Current Year Direct Costs: \$100,000  
Role (Effort) Co-PI (no formal effort requirement)

Sponsor: National Institutes of Health; NIAID; R01  
Title: “Single-Cell Virology”  
Duration: 07/01/15-05/31/19  
Current Year Direct Costs: \$366,250  
Role (Effort) Contact PI (1.0 months)

**Teaching:**

Aug. 1997 - May 2004 Instructor of record, Enzyme Structure-Function and Mechanism Journal Club (BMMB 510), Pennsylvania State University (Per semester, this course required one or two 50-minute presentations, one hour of organizational time and in-class critique and discussion leader for 13-14 sessions.)

Aug. 1998 – Dec. 2002 Instructor, Medical Virology (BMB/Micrb/Vet Sc 435), Pennsylvania State University (Per semester, this course requires 26, 50-minute lectures, corresponding preparation time and at least 60 additional hours for assisting students.)

Jan. 1999 - May 1999

Jan. 2011 - May 2011

Jan. 2014 - May 2014

Instructor, Survey of Biochemistry Literature (BMB 411), Pennsylvania State University (Per semester, this course requires 3, 50-min lectures, 30

hours of organizational and preparation time, facilitation of learning objectives in 12, 50-min sessions, and 6-12 hours for assisting students.)

- Aug. 2003 – present      Instructor, Freshman Seminar (PSU 016), Pennsylvania State University (Per semester, this course requires 3, 50-minute lectures, corresponding preparation, facilitation of 12, 50-min sessions and 5-10 hours for assisting students.)
- Jan. 2012 - May 2012      Instructor, Laboratory in Molecular Genetics (BMB 445W), Pennsylvania State University. (I covered two sections for the first half of the semester. I had two teaching assistants. Per semester, this course requires 12, 50-minute lectures, corresponding preparation time, 24, 3-hour laboratory sessions and at least 60 hours for assisting students.)
- Jan. 2014 - May 2014      Instructor, Critical Analysis of the Scientific Literature (BMMB 598B), Pennsylvania State University.
- Jan. 2015 - May 2015      Instructor, General Virology (MICRB 415), Pennsylvania State University.
- Aug. 2017 - present      Instructor, General Biochemistry (BMB 401), Pennsylvania State University. Average enrollment is 150 students. (Per semester, this course requires 26, 50-minute lectures, corresponding preparation time (260 hours for first year), and 45 hours for assisting students.)

**Invited Talks:**

International meetings and workshops

- [1] “Mechanism of HIV RT-catalyzed DNA Strand Transfer Reactions”  
Keystone Symposium on “Viral Genome Replication”  
March 1996, Tamarron, Colorado
- [2] “Kinetic Analysis of Poliovirus RNA-dependent RNA Polymerase (3D<sup>pol</sup>): Jumps in the Right Direction”  
Fifth International Symposium on “Positive Strand RNA Viruses”  
May 1998, St. Petersburg, Florida
- [3] “Biochemical Analysis of Poliovirus RNA Synthesis”  
Satellite Symposium on “Viral RNA Replication and Transcription”  
American Society for Virology – 18<sup>th</sup> Annual Meeting  
July 1999, Amherst, Massachusetts
- [4] “Quasispecies, Error Catastrophe and the Antiviral Activity of Ribavirin”  
NCI HIV Drug Resistance Program Symposium on “Understanding Antiviral Drug Resistance”  
December 2000, Chantilly, Virginia



- [5] “Quasispecies, Error Catastrophe and the Antiviral Activity of Ribavirin”  
Viruses and Cells Gordon Conference  
June 2001, Tilton, New Hampshire
- [6] “Lethal mutagens: A promising new class of antiviral agents”  
Case Western Reserve University Center for Aids Research  
Mechanisms of Viral Latency: HIV and Its Co-factors (Session 4 – Evolution/Escape  
Mechanisms/Drug Resistance)  
May 2003, Cleveland, Ohio
- [7] “Biochemical analysis of HCV NS5a protein”  
Tenth International Symposium on Hepatitis C Virus and Related Viruses  
December 2003, Kyoto, Japan
- [8] “Incorporation fidelity of the viral RNA-dependent RNA polymerase”  
European Study Group on the Molecular Biology of Picornaviruses  
May 2005, Lunteren, The Netherlands
- [9] “RNA-dependent RNA polymerase (in)fidelity: Mechanisms, consequences and applications”  
EMBL Workshop on RNA Viruses  
August 2007, Vienna, Austria
- [10] “A universal strategy for vaccine development”  
Session on: “Integrating Discovery and Applications”  
American Society for Biochemistry and Molecular Biology Annual Meeting  
April 2008, San Diego, CA
- [11] “Pre- and post-replication functions for the picornavirus 3CD protein”  
European Study Group on the Molecular Biology of Picornaviruses  
May 2008, Sitges (Barcelona), Spain
- [12] “Components of the picornavirus genome-replication machinery function in genome encapsidation”  
2008 FASEB Virus Structure and Assembly Meeting  
June 2008, Saxtons River, VT
- [13] “Picornavirus genome replication”  
American Society for Virology Annual Meeting  
July 2008, Ithaca, NY
- [14] “Dynamics of the viral RNA-dependent RNA polymerase: Determinant of incorporation fidelity and viral virulence and universal platform for live-virus vaccine design”  
Enzymes, Coenzymes, and Metabolic Pathways Gordon Research Conference  
July 2009, Waterville Valley, NH
- [15] “New strategies to treat and prevent viral infection revealed from studies of mechanisms of ribavirin resistance”  
10<sup>th</sup> Annual Symposium on Antiviral Drug Resistance  
November 2009, Wyndham, VA

- [16] “Towards a universal mechanism for viral attenuation and vaccine development”  
American Society for Microbiology Annual Meeting (Division T Symposium)  
May 2010, San Diego, CA
- [17] “Human mitochondrial transcription”  
RNAP2010 – Structure, function and evolution of RNA polymerases  
Biochemical Society (UK) and Wellcome Trust  
September 2010, Hinxton, Cambridgeshire, England
- [18] “Human mitochondrial transcription”  
The Expanding Roles of Mitochondria in Cell Biology and Disease  
Howard Hughes Medical Institute  
May 2011, Janelia Farm Research Center, VA
- [19] “Human mitochondrial transcription”  
Mitochondrial Medicine 2011 Symposium  
United Mitochondrial Disease Foundation  
June 2011, Schaumburg, IL
- [20] “Regulation of mammalian mitochondrial transcription”  
2011 FASEB conference: Mechanism and Regulation of Prokaryotic Transcription  
June 2011, Saxtons River, VT
- [21] “Regulation of mammalian mitochondrial transcription”  
2011 FASEB conference: Mitochondrial Assembly and Dynamics in Health, Disease and Aging  
July 2011, Steamboat Grand Resort, CO
- [22] “HCV persistence and inhibition”  
2012 International Symposium on RNA Viruses  
Chang Gung University, Taoyuan, Taiwan  
November 2012
- [23] “Principles and applications of RNA virus population diversity”  
2012 International Symposium on Infectious Disease and Signal Transduction  
November 2012, College of Medicine, National Cheng Kung University, Tainan City, Taiwan
- [24] “The implications of population genetics theory on survival and virulence of an RNA virus”  
Workshop in Virus Evolution  
March 2013, Hershey, PA
- [25] “When the genome is not enough: how hepatitis C virus expands its proteome”  
2013 Meeting of the Society for General Microbiology (UK)  
March 2013, Manchester, UK
- [26] “Contributions of HCV NS5a phosphorylation to viral replication and persistence”  
Viruses and Cells Gordon Conference  
May 2013, Il Ciocco, Barga, Italy

- [27] “Misregulated transcription in human mitochondria and disease”  
2013 FASEB conference: Mitochondrial Assembly and Dynamics in Health, Disease and Aging  
June 2013, Big Sky, MT
- [28] “Misregulated transcription in human mitochondria and disease”  
11<sup>th</sup> International Conference on Environmental Mutagens  
Foz do Iguassu, PR, Brazil  
November 2013
- [29] “New paradigms for regulation of human mitochondrial transcription”  
Session on: "Emerging Roles of Mitochondria in Cell signaling, Physiology and Disease"  
American Society for Microbiology Annual Meeting (Division T Symposium)  
April 2014, San Diego, CA
- [30] “Next-Gen Virology: Use of microfluidics and live-cell imaging to study poliovirus replication at the single-cell level”  
2014 International Symposium on RNA Viruses  
Chang Gung University  
October 2014, Taoyuan, Taiwan
- [31] “New paradigms for regulation of human mitochondrial transcription”  
Session on: "Mitochondrial Genome Dynamics: New Concepts in Function and Disease"  
Annual Meeting of the Biophysical Society  
February 2015, Baltimore, MD
- [32] “Next-Gen Virology: Use of microfluidics and live-cell imaging to study poliovirus replication at the single-cell level”  
Viral Diseases Panel, 18th International Conference on Emerging Infectious Diseases  
US-Japan Cooperative Medical Sciences Program  
January 2016, Bethesda, MD
- [33] “New Functional Forms of HCV NS5A Protein in vivo?”  
Session on: "Recombination, Replication Fidelity and RdRp Structure"  
Keystone Symposia: Positive-Strand RNA Viruses  
May 2016, Austin, TX
- [34] “Regulation of Mitochondrial Transcription by TFAM-directed Sequence-specific mtDNA Looping”  
Mitochondrial Medicine 2016 Symposium  
United Mitochondrial Disease Foundation  
June 2016, Seattle, WA
- [35] “Single-cell virology: On-chip investigation of viral infection dynamics”  
European Study Group on the Molecular Biology of Picornaviruses  
September 2016, les Diablerets, Switzerland
- [36] "Unexpected sequences and structures of mtDNA required for efficient transcription from the first heavy-strand promoter"

Translational Research in Mitochondria, Aging and Disease (TRiMAD) Symposium  
Center for Mitochondrial and Epigenomic Medicine  
Children's Hospital of Philadelphia  
October 2016, Philadelphia, PA

- [37] “A new mechanistic class of antiviral ribonucleoside discovered by using magnetic tweezers to monitor the activity of a viral polymerase”  
Nucleosides, Nucleotides & Oligonucleotides Gordon Research Conference  
June 2017, Newport, RI
- [38] “Induction of phospholipid biosynthesis and membrane biogenesis by an RNA virus”  
2018 International Symposium on RNA viruses  
Tzu Chi University,  
March 2018, Hualien, Taiwan
- [39] “The P3 A, B, C, and D’s of picornavirus genome replication”  
European Study Group on the Molecular Biology of Picornaviruses  
June 2018, Egmond aan Zee, The Netherlands
- [40] “Single-cell virology: On-chip investigation of viral infection dynamics”  
Satellite Symposium on Single-Cell Virology  
2018 Annual Meeting of the American Society for Virology  
University of Maryland  
July 2018, College Park, MD
- [41] “Distinct organelles for genome replication and virus assembly during poliovirus replication”  
2018 FASEB Virus Structure and Assembly Meeting  
July 2018, Steamboat Springs, CO

Universities or research institutions

- [1] “Mechanism of HIV RT-catalyzed DNA Strand Transfer Reactions”  
Unite de Physicochimie des Macromolecules Biologiques, Institut Pasteur, Paris, France  
December 1995
- [2] “Mechanism of HIV RT-catalyzed DNA Strand Transfer Reactions”  
Max-Planck-Institut für Biochemie, Martinsried, Germany  
December 1995
- [3] “Retrovirus Replication: Genesis and Exodus”  
Department of Biochemistry and Molecular Biology, Pennsylvania State University,  
University Park, PA  
February 1996
- [4] “Kinetic Mechanism of Dihydrofolate Reductase Revisited”  
Department of Biochemistry, School of Medicine, Case Western Reserve University,  
Cleveland, OH  
April 1996

- [5] “Mechanism of HIV RT-catalyzed DNA Strand Transfer Reactions”  
Center for Advanced Biotechnology and Medicine, Rutgers University, Piscataway, NJ  
August 1996
- [6] “Mechanism of HIV RT-catalyzed DNA Strand Transfer Reactions”  
Department of Molecular Genetics, University of Medicine and Dentistry of New Jersey,  
Robert Wood Johnson Medical School, Piscataway, NJ  
October 1996
- [7] “Mechanism of HIV RT-catalyzed DNA Strand Transfer Reactions”  
Department of Microbiology and Immunology, Pennsylvania State University College of  
Medicine, Hershey, PA  
March 1997
- [8] “Mechanistic Studies of Poliovirus RNA-dependent RNA Polymerase”  
Laboratory of Infectious Diseases, NIAID, NIH, Bethesda, MD  
April 1999
- [9] “Mechanistic Studies of Poliovirus RNA-dependent RNA Polymerase”  
Department of Microbiology and Immunology, Pennsylvania State University College of  
Medicine, Hershey, PA  
September 1999
- [10] “Towards a Pill for the Common Cold”  
Department of Chemistry, Shippensburg University, Shippensburg, PA  
October 1999
- [11] “Towards a Pill for the Common Cold”  
Division of Science, Chatham College, Pittsburgh, PA  
October 1999
- [12] “Towards a Pill for the Common Cold”  
Department of Biology, Washington and Jefferson College, Washington, PA  
October 1999
- [13] “Insight into Mechanism of Action of Ribavirin from Studies with Poliovirus Polymerase”  
Department of Biochemistry and Molecular Biology, Indiana University School of Medicine,  
Indianapolis, IN  
February 2000
- [14] “Insight into Mechanism of Action of Ribavirin from Studies with Poliovirus Polymerase”  
Department of Biochemistry and Molecular Biology, University of Arkansas for Medical  
Sciences, Little Rock, AR  
March 2000
- [15] “Insight into Mechanism of Action of Ribavirin from Studies with Poliovirus Polymerase”  
Department of Molecular Microbiology & Immunology, St. Louis University, St. Louis, MO

April 2000

- [16] “Insight into Mechanism of Action of Ribavirin from Studies with Poliovirus Polymerase”  
Laboratoire de biochimie, Département de chimie, Université catholique de Louvain,  
Brussels, Belgium  
May 2000
- [17] “Insight into Mechanism of Action of Ribavirin from Studies with Poliovirus Polymerase”  
Keynote Address for the 23<sup>rd</sup> Annual Student Research Symposium  
UMDNJ-Robert Wood Johnson Medical School, Piscataway, NJ  
July 2000
- [18] “Towards a Pill for the Common Cold”  
Department of Chemistry, Western Maryland College, Westminster, MD  
September 2000
- [19] “Towards a Pill for the Common Cold”  
Department of Chemistry, Juniata College, Huntingdon, PA  
September 2000
- [20] “Insight into Mechanism of Action of Ribavirin from Studies with Poliovirus Polymerase”  
Department of Chemistry, Edinboro University of Pennsylvania, Edinboro, PA  
April 2001
- [21] “Insight into Mechanism of Action of Ribavirin from Studies with Poliovirus Polymerase”  
Department of Biochemistry and Microbiology, Cook College, Rutgers, New Brunswick, NJ  
April 2001
- [22] “Structure, Function and Mechanism of the Poliovirus RNA-dependent RNA Polymerase”  
Department of Molecular Genetics and Microbiology, SUNY, Stony Brook, NY  
September 2001
- [23] “Quasispecies, Error Catastrophe and the Antiviral Activity of Ribavirin”  
Organized Research Unit in Animal Virology, University of California, Irvine, CA  
March 2002
- [22] “Structure, Function and Mechanism of the Poliovirus RNA-dependent RNA Polymerase”  
Center for the Study of Hepatitis C Virus, Rockefeller University, New York, NY  
April 2002
- [23] “The Viral RNA-dependent RNA Polymerase: Forcing Riboviruses to the Edge of Catastrophe  
and Beyond”  
Department of Biochemistry, School of Medicine, Tulane University, New Orleans, LA  
October 2002
- [24] “Building the HCV Replisome: The bricks are in place and the mortar is on the way”  
Department of Microbiology, Immunology and Parasitology, Louisiana State University  
Health Sciences Center, New Orleans, LA  
October 2002

- [25] “The Viral RNA-dependent RNA Polymerase: Forcing Riboviruses to the Edge of Catastrophe and Beyond”  
Department of Microbiology & Immunology, University of Texas Medical Branch, Galveston, TX  
January 2003
- [25] “The Viral RNA-dependent RNA Polymerase: Forcing Riboviruses to the Edge of Catastrophe and Beyond”  
Department of Microbiology & Immunology, University of Texas Health Science Center  
San Antonio, TX  
March 2003
- [26] “Biochemical Analysis of HCV NS5a Protein”  
Peking University Hepatology Institute  
Beijing, China  
November 2003
- [27] “Viral RNA-dependent RNA Polymerases: Structure, Function, Mechanism and Inhibition”  
Division of Pediatric Infectious Diseases, Vanderbilt University School of Medicine  
Nashville, TN  
December 2003
- [28] “More Than Two Metal Ions in the Mechanism for Phosphoryl Transfer Catalyzed by the Viral RNA-dependent RNA Polymerase”  
Department of Chemistry, Temple University  
Philadelphia, PA  
April 2004
- [29] “More Than Two Metal Ions in the Mechanism for Phosphoryl Transfer Catalyzed by the Viral RNA-dependent RNA Polymerase”  
Department of Biophysics and Biophysical Chemistry, Johns Hopkins University School of Medicine  
Baltimore, MD  
May 2004
- [30] “More Than Two Metal Ions in the Mechanism for Phosphoryl Transfer Catalyzed by the Viral RNA-dependent RNA Polymerase”  
Department of Pharmacology, Case Western Reserve University School of Medicine  
Cleveland, OH  
September 2004
- [31] “More Than Two Metal Ions in the Mechanism for Phosphoryl Transfer Catalyzed by the Viral RNA-dependent RNA Polymerase”  
Biochemistry Program, Ohio State University  
Columbus, OH  
October 2004
- [32] “More Than Two Metal Ions in the Mechanism for Phosphoryl Transfer Catalyzed by the Viral RNA-dependent RNA Polymerase”

Department of Biochemistry and Molecular Biology, University of Arkansas for Medical Sciences  
Little Rock, AR  
November 2004

- [33] “Exposure, Experience, Enthusiasm”  
Bridging the Career Gap for Underrepresented Minorities (A workshop sponsored by NIAID/NIH)  
Bethesda, MD  
November 2005
  
- [34] “Biochemical and Biological Analysis of HCV NS5a Protein”  
Department of Microbiology, Immunology and Molecular Genetics  
University of Kentucky College of Medicine  
November 2005
  
- [35] “The Viral RNA-dependent RNA Polymerase: Forcing Riboviruses to the Edge of Catastrophe and Beyond”  
DARPA Workshop on State-Dependent Delays in Regulatory Networks  
Center for Discrete Mathematics & Theoretical Computer Science, Rutgers University  
Piscataway, NJ  
March 2006
  
- [36] “The Viral RNA-dependent RNA Polymerase: Forcing Riboviruses to the Edge of Catastrophe and Beyond”  
Department of Microbiology and Molecular Genetics, Harvard Medical School  
Boston, MA  
March 2006
  
- [37] “More Than Two Metal Ions in the Mechanism for Phosphoryl Transfer Catalyzed by the Viral RNA-dependent RNA Polymerase”  
Department of Biochemistry and Molecular Biology, Michigan State University  
Kalamazoo, MI  
April 2006
  
- [38] “RNA-dependent RNA polymerase (in)fidelity: Mechanisms, consequences and applications”  
Department of Chemistry and Biochemistry, University of Maryland, Baltimore County  
Baltimore, MD  
October 2006
  
- [39] “RNA-dependent RNA polymerase (in)fidelity: Mechanisms, consequences and applications”  
Department of Biochemistry and Molecular Biology, UMDNJ – New Jersey Medical School  
Newark, NJ  
October 2006
  
- [40] “RNA-dependent RNA polymerase (in)fidelity: Mechanisms, consequences and applications”  
Department of Chemistry, Lincoln University  
Lincoln University, PA  
February 2007



- [41] “RNA-dependent RNA polymerase (in)fidelity: Mechanisms, consequences and applications”  
Department of Biomedical Sciences, Division of Microbial Pathogenesis & Immune Response,  
Meharry Medical College  
Nashville, TN  
March 2007
- [42] “RNA-dependent RNA polymerase (in)fidelity: Mechanisms, consequences and applications”  
Department of Biochemistry and Molecular Biology, Colorado State University  
Fort Collins, CO  
April 2007
- [43] “Building and Managing a Team”  
1<sup>st</sup> NIAID New Investigator Workshop (A workshop sponsored by NIAID/NIH)  
Bethesda, MD  
October 2007
- [44] “RNA-dependent RNA polymerase (in)fidelity: Mechanisms, consequences and applications”  
Department of Microbiology and Immunology, SUNY Buffalo School of Medicine  
Buffalo, NY  
October 2007
- [45] “RNA-dependent RNA polymerase (in)fidelity: Mechanisms, consequences and applications”  
Department of Biochemistry, Case Western Reserve University School of Medicine  
Cleveland, OH  
April 2008
- [46] “RNA-dependent RNA polymerase (in)fidelity: Mechanisms, consequences and applications”  
Department of Microbiology and Immunology, University of Michigan School of Medicine  
Ann Arbor, MI  
September 2008
- [47] “Towards a universal strategy for viral attenuation and vaccine development”  
Department of Cell Biology and Molecular Genetics, University of Maryland  
College Park, MD  
October 2008
- [48] “Composition, organization and assembly of the picornavirus VPg uridylylation complex”  
Keynote address: Virology Training Program Retreat, University of Maryland  
College Park, MD  
October 2008
- [49] “Exploiting the RNA virus quasispecies for antiviral and vaccine development”  
Carolina Vaccine Institute, University of North Carolina  
Chapel Hill, NC  
November 2008
- [50] “Exploiting the RNA virus quasispecies for antiviral and vaccine development”  
Distinguished Lecture Series, Huck Institutes of the Life Sciences, Pennsylvania State University

State College, PA  
December 2008

- [51] “Exploiting the RNA virus quasispecies for antiviral and vaccine development”  
Department of Microbiology and Immunology, Georgetown University Medical Center  
Washington, DC  
April 2009
- [52] “Exploiting the RNA virus quasispecies for antiviral and vaccine development”  
Center for Biologics Evaluation and Research, U.S. Food and Drug Administration  
Bethesda, MD  
June 2009
- [53] “Exploiting the RNA virus quasispecies for antiviral and vaccine development”  
Department of Microbiology and Immunology, Indiana University School of Medicine (IUPUI)  
Indianapolis, IN  
September 2009
- [54] “RNA-dependent RNA polymerase (in)fidelity: Mechanisms, consequences and applications”  
Department of Chemistry, St. Francis University  
Loretto, PA  
November 2009
- [55] “NS5A: The Swiss army knife of the hepatitis C virus”  
Department of Chemistry, The City College of New York  
New York, NY  
August 2010
- [56] “NS5A: The Swiss army knife of the hepatitis C virus”  
Department of Biological Sciences, Rutgers University  
Newark, NJ  
October 2010
- [57] “NS5A: The Swiss army knife of the hepatitis C virus”  
Department of Biochemistry and Molecular Biology, University of Arkansas for Medical Sciences  
Little Rock, AR  
November 2010
- [58] “NS5A: The Swiss army knife of the hepatitis C virus”  
Department of Microbiology and Immunology and Division of Infectious Diseases, Johns  
Hopkins Medical Institutions  
Baltimore, MD  
November 2010
- [59] “Principles and applications of RNA virus population diversity”  
Microbial and Viral Evolution Program, Kavli Institute of Physics, University of California  
Santa Barbara, CA  
February 2011

- [60] “Human mitochondrial transcription”  
Department of Animal Biology, School of Veterinary Medicine, University of Pennsylvania  
Philadelphia, PA  
April 2011
- [61] “NS5A: The Swiss army knife of the hepatitis C virus”  
Department of Molecular Microbiology and Immunology  
University of Missouri-Columbia  
Columbia, MO  
September 2011
- [62] “Principles and applications of RNA virus population diversity”  
Molecular Basis of Disease Distinguished Lecture Series  
Department of Biology, Georgia State University  
Atlanta, GA  
October 2011
- [63] “Transitioning to the translational: Hepatitis C virus persistence and inhibition”  
Department of Biomolecular Chemistry, University of Wisconsin School of Medicine and  
Public Health  
Madison, Wisconsin  
May 2012
- [64] “Transitioning to the translational: Hepatitis C virus persistence and inhibition”  
Department of Microbiology and Immunology, University of Buffalo School of Medicine  
Buffalo, NY  
May 2012
- [65] “Transitioning to the translational: Hepatitis C virus persistence and inhibition”  
Center for Mitochondrial and Epigenetic Medicine  
Children’s Hospital of Philadelphia and University of Pennsylvania  
Philadelphia, PA  
May 2012
- [66] “Transitioning to the translational: Hepatitis C virus persistence and inhibition”  
Department of Molecular Biology and Microbiology and Immunology  
School of Medicine, Case Western Reserve University  
Cleveland, OH  
June 2012
- [67] “Hepatitis C virus persistence and inhibition”  
2012 Diversity and Health Disparity Symposium  
Intramural Research Program, National Institute of Drug Abuse  
Baltimore, MD  
August 2012
- [68] “Hepatitis C virus persistence and inhibition”

Department of Microbiology and Immunology  
Penn State College of Medicine  
Hershey, PA  
October 2012

- [69] “Hepatitis C virus persistence and inhibition”  
Program in Infection and Pathobiology  
Baker Institute for Animal Health  
College of Veterinary Medicine  
Cornell University  
Ithaca, NY  
March 2013
- [70] "Human mitochondrial transcription"  
National Institute of Environmental Health Sciences  
Research Triangle Park, NC  
September 2013
- [71] "mtDNA mutations and cancer"  
Department of Biochemistry  
University of Illinois  
Urbana-Champaign, IL  
October 2013
- [72] “Hepatitis C virus persistence and inhibition”  
Department of Microbiology and Immunology  
University of Texas Health Science Center San Antonio  
San Antonio, TX  
April 2014
- [73] “Misregulated mitochondrial transcription and disease”  
Department of Chemistry and Biochemistry  
University of Maryland Baltimore County  
Baltimore, MD  
May 2014
- [74] “Next-Gen Virology: Use of microfluidics and live-cell imaging to study poliovirus replication at the single-cell level”  
UCSF Program in Host-Pathogen Systems and Evolution (Symposium/Retreat)  
University of California San Francisco, Mission Bay Campus  
San Francisco, CA  
August 2014
- [75] “Next-Gen Virology: Use of microfluidics and live-cell imaging to study poliovirus replication at the single-cell level”  
Novartis Institute for Tropical Diseases  
Singapore  
October 2014

- [76] “Next-Gen Virology: Use of microfluidics and live-cell imaging to study poliovirus replication at the single-cell level”  
Division of Structural Biology and Biochemistry  
School of Biological Sciences  
Nanyang Technological University  
Singapore  
October 2014
- [77] "The viral RNA-dependent RNA polymerase: A target for antiviral therapy and viral attenuation"  
Taichung Medical University  
Taichung, Taiwan  
October 2014
- [78] “Misregulated mitochondrial transcription and disease”  
University of Kansas Cancer Center  
Kansas City, KS  
April 2015
- [79] “Next-Gen Virology: Use of microfluidics and live-cell imaging to study poliovirus replication at the single-cell level”  
Department of Biochemistry and Molecular Biology  
Thomas Jefferson University  
Philadelphia, PA  
September 2015
- [80] “Next-Gen Virology: Use of microfluidics and live-cell imaging to study poliovirus replication at the single-cell level”  
Harbin Veterinary Research Institute  
Harbin, People's Republic of China  
September 2015
- [81] “Next-Gen Virology: Use of microfluidics and live-cell imaging to study poliovirus replication at the single-cell level”  
Department of Life Science and Institute of Biotechnology  
National Dong Hwa University  
Hualien, Taiwan  
March 2016
- [82] “Next-Gen Virology: Use of microfluidics and live-cell imaging to study poliovirus replication at the single-cell level”  
Chang Gung University  
TaoYuan, Taiwan  
March 2016
- [83] “Next-Gen Virology: Use of microfluidics and live-cell imaging to study poliovirus replication at the single-cell level”  
Department of Molecular Biosciences

University of Texas at Austin  
Austin, TX  
May 2016

- [84] “Single-cell virology: On-chip investigation of viral replication dynamics”  
Department of Microbiology  
Hong Kong University  
Hong Kong  
February 2017
- [85] “Single-cell virology: On-chip investigation of viral replication dynamics”  
Department of Medical Laboratory Science and Biotechnology  
China Medical University at Taichung  
Taichung, Taiwan  
February 2017
- [86] “Single-cell virology: On-chip investigation of viral replication dynamics”  
Graduate Institute of Biomedical Sciences  
Chang Gung University  
Taoyuan, Taiwan  
February 2017
- [87] “Single-cell virology: On-chip investigation of viral replication dynamics”  
Distinguished Scientist Seminar Series  
College of Medicine  
University of South Alabama  
Mobile, AL  
March 2017
- [88] “Single-cell virology: On-chip investigation of viral replication dynamics”  
Department of Chemistry and Biochemistry  
University of Texas at Arlington  
Arlington, TX  
April 2017
- [89] “Single-cell virology: On-chip investigation of viral replication dynamics”  
Ernie Simms Lecture  
Department of Microbiology  
Washington University of St. Louis  
St. Louis, MO  
May 2017
- [90] “New Approaches to Study the Mechanism and Biology of Antiviral Nucleos(t)ides”  
Department of Biology  
Gettysburg College  
Gettysburg, PA  
September 2017

- [91] Dr. Milton J. Hernandez Lecture in Mentoring Excellence  
NIAID Bridging the Career Gap: Promoting Diversity in Biological Research  
NIAID, NIH  
Rockville, MD  
October 2017
- [92] “Targeting a viral polymerase for antiviral therapy: Insight from studies of single molecules and single, infected cells”  
T32 Trainee-Invited Speaker  
Department of Pharmacology and Physiology  
University of Rochester Medical Center  
Rochester, NY  
April 2018
- [93] “Targeting a viral polymerase for antiviral therapy: Insight from studies of single molecules and single, infected cells”  
Department of Molecular and Cellular Biochemistry  
Indiana University  
Bloomington, IN  
April 2018
- [94] “Targeting a viral polymerase for antiviral therapy: Insight from studies of single molecules and single, infected cells”  
Microbiology Graduate Program Seminar Series  
Department of Microbial Pathogenesis  
Yale University School of Medicine  
New Haven, CT  
April 2018
- [94] “Targeting a viral polymerase for antiviral therapy: Insight from studies of single molecules and single, infected cells”  
Department of Microbiology and Immunology  
University of Michigan School of Medicine  
Ann Arbor, MI  
June 2018

#### Companies

- [1] “Mechanism of HIV RT-catalyzed DNA Strand Transfer Reactions”  
Discovery Research, Viropharma, Inc., Malvern, PA  
August 1997
- [2] “Mechanistic Studies of Poliovirus RNA-dependent RNA Polymerase”  
Discovery Research, Viropharma, Inc., Exton, PA  
February 1999
- [3] “Mechanistic Studies of Poliovirus RNA-dependent RNA Polymerase”  
Antiviral Therapy, Schering-Plough Research Institute, Kenilworth, NJ

March 1999

- [4] “Mechanistic Studies of Poliovirus RNA-dependent RNA Polymerase”  
Department of Molecular Virology and Host Defense, SmithKline Beecham Pharmaceuticals,  
Collegeville, PA  
May 1999
- [5] “Mechanistic Studies of Poliovirus RNA-dependent RNA Polymerase”  
Antiviral Research, Merck Research Laboratories, West Point, PA  
August 1999
- [6] “Insight into Mechanism of Action of Ribavirin from Studies with Poliovirus Polymerase”  
Antiviral Therapy, Schering-Plough Research Institute, Kenilworth, NJ  
November 1999
- [7] “Insight into Mechanism of Action of Ribavirin from Studies with Poliovirus Polymerase”  
BioMega Research Division, Boehringer Ingelheim Canada Ltd., Laval, Canada  
February 2000
- [8] “Insight into Mechanism of Action of Ribavirin from Studies with Poliovirus Polymerase”  
BioChem Pharma, Montreal, Canada  
February 2000
- [9] “Insight into Mechanism of Action of Ribavirin from Studies with Poliovirus Polymerase”  
DuPont, West Point, PA  
August 2000
- [10] “Targeting the Viral RNA-dependent RNA Polymerase for Antiviral Drug Development”  
ICN Pharmaceuticals, Inc., Costa Mesa, CA  
October 2000
- [11] “Targeting the Viral RNA-dependent RNA Polymerase for Antiviral Drug Development”  
Wyeth Ayerst Research, Pearl River, NY  
August 2001
- [12] “Targeting the Viral RNA-dependent RNA Polymerase for Antiviral Drug Development”  
Gilead Sciences, San Francisco, CA  
August 2001
- [13] “Targeting the Viral RNA-dependent RNA Polymerase for Antiviral Drug Development”  
Eli Lilly, Indianapolis, IN  
October 2001
- [14] “Designing Lethal Mutagens of the RNA Virus Genome”  
ICN Pharmaceuticals, Costa Mesa, CA  
February 2002



- [15] “The Viral RNA-dependent RNA Polymerase: Forcing Riboviruses to the Edge of Catastrophe and Beyond”  
Gilead Sciences, San Francisco, CA  
February 2003
- [16] “Biochemical and Biological Analysis of HCV NS5a Protein”  
Bristol Myers Squibb Company, Wallingford, CT  
March 2004
- [17] “Biochemical and Biological Analysis of HCV NS5a Protein”  
Roche Palo Alto, Palo Alto, CA  
May 2004
- [18] “Biochemical and Biological Analysis of HCV NS5a Protein”  
Valeant Pharmaceuticals International, Costa Mesa, CA  
August 2004
- [19] “Biochemical and Biological Analysis of HCV NS5a Protein”  
Pfizer Global Research and Development, La Jolla, CA  
August 2005
- [20] “Biochemical and Biological Analysis of HCV NS5a Protein”  
Genelabs Technologies, Inc., Redwood City, CA  
March 2006
- [21] “HCV NS5A Protein: Functions in Genome Replication, Genome Persistence and Antagonism of the Innate Immune Response”  
PTC Therapeutics, Inc., South Plainfield, NJ  
March 2008
- [22] “HCV NS5A Protein: Functions in Genome Replication, Genome Persistence and Antagonism of the Innate Immune Response”  
Merck Research Laboratories, West Point, PA  
October 2008
- [23] “HCV NS5A Protein: Functions in Genome Replication, Genome Persistence and Antagonism of the Innate Immune Response”  
Gilead Sciences, Foster City, CA  
January 2009
- [24] “HCV NS5A Protein: Functions in Genome Replication, Genome Persistence and Antagonism of the Innate Immune Response”  
Roche Palo Alto, Palo Alto, CA  
January 2009
- [25] “Targets and mechanisms for development of antiviral therapeutics to treat infections by positive-strand RNA viruses”

Schering-Plough Research Institute, Kenilworth, NJ  
March 2009

- [26] “HCV NS5A Protein: Functions in Genome Replication, Genome Persistence and Antagonism of the Innate Immune Response”  
Merck Frosst Centre for Therapeutic Research, Montreal, Quebec, Canada  
June 2010
- [27] “Anti-HCV therapeutics: Opportunities and complications”  
Roche, Nutley, NJ  
September 2011
- [28] “Avoiding a billion dollar mistake: Mitochondrial (dys)function as a contributor to drug toxicity”  
Alios Biopharma, San Francisco, CA  
February 2013
- [29] “Avoiding a billion dollar mistake: Mitochondrial (dys)function as a contributor to drug toxicity”  
PTC Therapeutics, South Plainfield NJ  
September 2013 (via skype)
- [30] “Avoiding a billion dollar mistake: Mitochondrial (dys)function as a contributor to drug toxicity”  
Alnylam Pharmaceuticals, Boston, MA  
September 2013
- [31] “Next-Gen Virology: Use of microfluidics and live-cell imaging to study poliovirus replication at the single-cell level”  
PTC Therapeutics, South Plainfield NJ  
April 2015
- [30] “Avoiding a billion dollar mistake: Mitochondrial (dys)function as a contributor to drug toxicity”  
AbbVie, Inc., North Chicago, IL  
July 2015
- [31] “Targeting a viral polymerase for antiviral therapy: Insight from studies of single molecules and single, infected cells”  
New England BioLabs,  
May 2018

## **Publications:**

### Refereed Journal Articles

- [1] Bizub, D., Weber, I.T., **Cameron, C.E.**, Leis, J.P., and Skalka, A.M. (1991). A range of catalytic efficiencies with avian retroviral protease subunits genetically linked to form single polypeptide chains. **J. Biol. Chem.** **266**, 4951-4958.

- [2] Grinde, B., **Cameron, C.E.**, Leis, J., Weber, I., Wlodawer, A., Burstein, H., Bizub, D., and Skalka, A.M. (1992). Mutations that alter the activity of the Rous sarcoma virus protease. **J. Biol. Chem.** **267**, 9481-9490.
- [3] Grinde, B., **Cameron, C.E.**, Leis, J., Weber, I., Wlodawer, A., Burstein, H., and Skalka, A.M. (1992). Analysis of substrate interactions of the Rous sarcoma virus wild type and mutant proteases and human immunodeficiency virus-1 protease using a set of systematically altered peptide substrates. **J. Biol. Chem.** **267**, 9491-9498.
- [4] **Cameron, C.E.**, Grinde, B., Jentoft, J., Leis, J., Weber, I., Copeland, T., and Wlodawer, A. (1992). Mechanism of inhibition of the retroviral protease by a Rous sarcoma virus peptide substrate representing the cleavage site between the gag p2 and p10 proteins. **J. Biol. Chem.** **267**, 23735-23741.
- [5] **Cameron, C.E.**, Grinde, B., Jacques, P., Jentoft, J., Leis, J., Weber, I., and Wlodawer, A. (1993). Comparison of the substrate binding pockets of the Rous sarcoma virus and human immunodeficiency virus type 1 proteases. **J. Biol. Chem.** **268**, 11711-11720.
- [6] **Cameron, C.E.**, Ridky, T.W., Shulenin, S., Leis, J., Weber, I., Wlodawer, A., Burstein, H., Bizub-Bender, D., and Skalka, A.M. (1994). Mutational analysis of the substrate binding pocket of the Rous sarcoma virus and human immunodeficiency virus-1 proteases. **J. Biol. Chem.** **269**, 11170-11177.
- [7] Wills, J.W., **Cameron, C.E.**, Wilson, C.B., Xiang, Y., Bennett, R.P., and Leis, J. (1994). An assembly domain of the Rous sarcoma virus gag protein required late in budding. **J. Virol.** **68**, 6605-6618.
- [8] Ghosh, M., Howard, K.J., **Cameron, C.E.**, Benkovic, S.J., Hughes, S.H., and Le Grice, S.F.J. (1995). Truncating  $\alpha$ -helix E' of p66 human immunodeficiency virus reverse transcriptase modulates RNase H function and impairs DNA strand transfer. **J. Biol. Chem.** **270**, 7068-7076.
- [9] Cirino, N.M., **Cameron, C.E.**, Smith, J.S., Roth, M.J., Benkovic, S.J., and Le Grice, S.F.J. (1995). Divalent cation modulation of the ribonuclease functions of human immunodeficiency virus reverse transcriptase. **Biochemistry** **34**, 9936-9943.
- [10] Ridky, T.W., **Cameron, C.E.**, Cameron, J.D., Leis, J., Copeland, T., Wlodawer, A., Weber, I.T., and Harrison, R.W. (1996). Human immunodeficiency virus type 1 protease substrate specificity is limited by interactions between substrate amino acids bound in adjacent enzyme subsites. **J. Biol. Chem.** **271**, 4709-4717.
- [11] Ridky, T.W., Bizub-Bender, D., **Cameron, C.E.**, Weber, I.T., Wlodawer, A., Copeland, T., Skalka, A.M., and Leis, J. (1996). Programming the Rous sarcoma virus protease to cleave new substrate sequences. **J. Biol. Chem.** **271**, 7719-7724.

- [12] Xiang, Y., **Cameron, C.E.**, Wilson, C., Wills, J., and Leis, J. (1996). Fine mapping and characterization of the Rous sarcoma virus Pr76gag late assembly domain. **J. Virol.** **70**, 5695-5700.
- [13] Shao, H., Robek, M.D., Threadgill, D.S., Mankowski, L.S., **Cameron, C.E.**, Fuller, F.J., and Payne, S.J. (1997). Characterization and mutational studies of equine infectious anemia virus dUTPase. **Biochim. Biophys. Acta** **1339**, 181-191.
- [14] **Cameron, C.E.**, Ghosh, M., Le Grice, S.F.J., and Benkovic, S.J. (1997). Mutations in HIV reverse transcriptase which alter RNase H activity and decrease strand transfer efficiency are suppressed by HIV nucleocapsid protein. **Proc. Natl. Acad. Sci. (USA)** **94**, 6700-6705.
- [15] **Cameron, C.E.** and Benkovic, S.J. (1997). Evidence for a functional role of the dynamics of glycine-121 of *Escherichia coli* dihydrofolate reductase obtained from kinetic analysis of a site-directed mutant. **Biochemistry** **36**, 15792-15800.
- [16] Arnold, J.J. and **Cameron, C.E.** (1999). Poliovirus RNA-dependent RNA polymerase (3D<sup>pol</sup>) is sufficient for template switching in vitro. **J. Biol. Chem.** **274**, 2706-2716.
- [17] Arnold, J.J., Ghosh, S.K.B., Bevilacqua, P.C., and **Cameron, C.E.** (1999). Single-nucleotide resolution of RNA strands in the presence of their RNA complements. **BioTechniques** **27**, 450-456.
- [18] Gohara, D.W., Ha, C.S., Ghosh, S.K.B., Arnold, J.J., Wisniewski, T.J., and **Cameron, C.E.** (1999). Production of “authentic” poliovirus RNA-dependent RNA polymerase (3D<sup>pol</sup>) by ubiquitin-protease-mediated cleavage in *Escherichia coli*. **Protein Expr. Purif.** **17**, 128-138.
- [19] Arnold, J.J., Ghosh, S.K.B., and **Cameron, C.E.** (1999). Poliovirus RNA-dependent RNA polymerase (3D<sup>pol</sup>): Divalent cation modulation of primer, template and nucleotide selection. **J. Biol. Chem.** **274**, 37060-37069.
- [20] Arnold, J.J. and **Cameron, C.E.** (2000). Poliovirus RNA-dependent RNA polymerase (3D<sup>pol</sup>): Assembly of stable, elongation-competent complexes by using a symmetrical primer/template substrate (sym/sub). **J. Biol. Chem.** **275**, 5329-5336.
- [21] Gohara, D.W., Crotty, S., Arnold, J.J., Yoder, J.D., Andino, R., and **Cameron, C.E.** (2000). Poliovirus RNA-dependent RNA polymerase (3D<sup>pol</sup>): Structural, biochemical and biological analysis of conserved structural motifs A and B. **J. Biol. Chem.** **275**, 25523-25532.
- [22] Zhong, W., Ferrari, E., Lesburg, C., Maag, D., Ghosh, S.K.B., **Cameron, C.E.**, Lau, J.Y.N., and Hong, Z. (2000). Template/primer requirements and single nucleotide incorporation by hepatitis C virus nonstructural protein 5B polymerase. **J. Virol.** **74**, 9134-9143.
- [23] Crotty, S., Maag, D., Arnold, J.J., Zhong, W., Lau, J.Y.N., Hong, Z., Andino, R., and **Cameron, C.E.** (2000). The broad-spectrum antiviral ribonucleoside ribavirin is an RNA virus mutagen. **Nature Medicine** **6**, 1375-1379. Erratum in: *Nat Med* 2001 Feb;7(2):255.

- [24] Tackett, A.J., Wei, L., **Cameron, C.E.**, and Raney, K.D. (2001). Unwinding of nucleic acids by HCV NS3 helicase is sensitive to the structure of the duplex. **Nucleic Acids Res.** **29**, 565-572.
- [25] Wei, L., Huhn, J.S., Mory, A., Pathak, H.B., Sosnovtsev, S.V., Green, K.Y., and **Cameron, C.E.** (2001). Proteinase-polymerase precursor as the active form of feline calicivirus RNA-dependent RNA polymerase. **J. Virol.** **75**, 1211-1219.
- [26] Crotty, S., **Cameron, C.E.**, and Andino, R. (2001). RNA virus error catastrophe: Direct molecular test by using ribavirin. **Proc. Natl. Acad. Sci. (USA)** **98**, 6895-6900. Epub 2001 May 22.
- [27] Hong, Z., **Cameron, C.E.**, Walker, M.P., Castro, C., Yao, N., Lau, J.Y., and Zhong, W. (2001). A novel mechanism to ensure terminal initiation by hepatitis C virus NS5B polymerase. **Virology** **285**, 6-11.
- [28] Maag, D., Castro, C., Hong, Z., and **Cameron, C.E.** (2001). Hepatitis C virus RNA-dependent RNA polymerase (NS5B) as a mediator of the antiviral activity of ribavirin. **J. Biol. Chem.** **276**, 46094-46098. Epub 2001 Oct 15.
- [29] Morris, P.D., Byrd, A.K., Tackett, A.J., Cameron, C.E., and Raney, K.D. (2002). Hepatitis C virus NS3 and simian virus 40 T antigen helicases displace streptavidin from 5'-biotinylated oligonucleotides but not from 3'-biotinylated oligonucleotides: evidence for directional bias in translocation on single-stranded DNA. **Biochemistry** **41**, 2372-2378.
- [30] Harki, D.A., Graci, J.D., Korneeva, V.S., Ghosh, S.K.B., Hong, Z., **Cameron, C.E.**, and Peterson, B.R. (2002). Synthesis and antiviral evaluation of a mutagenic and non-hydrogen bonding ribonucleoside analogue: 1- $\beta$ -D-ribofuranosyl-3-nitropyrrrole. **Biochemistry** **41**, 9026-9033.
- [31] Green K.Y., Mory A., Fogg, M.H., Weisberg, A., Belliot, G., Wagner, M., Mitra T., Ehrenfeld, E., **Cameron, C.E.**, and Sosnovtsev, S.V. (2002). Isolation of enzymatically active replication complexes from feline calicivirus-infected cells. **J. Virol.** **76**, 8582-8595.
- [32] Pathak H.P., Ghosh, S.K.B., Roberts, A.W., Sharma, S.D., Yoder, J.D., Arnold, J.J., Gohara, D.W., Barton, D.J., Paul, A.V., and **Cameron, C.E.** (2002). Structure-function relationships of the RNA-dependent RNA polymerase from poliovirus (3Dpol): A surface of the primary oligomerization domain functions in capsid precursor processing and VPg uridylylation. **J. Biol. Chem.** **277**, 31551-31562. Epub 2002 Jun 19.
- [33] Gorbalenya, A.E., Pringle, F.M., Zeddarn, J.-L., Luke, B.T., **Cameron, C.E.**, Kalmakoff, J., Hanzlik, T., Gordon, K., and Ward, V.K. (2002). The palm subdomain-based active site is internally permuted in viral RNA-dependent RNA polymerases of an ancient lineage. **J. Mol. Biol.** **324**, 47-62.
- [34] Crotty, S., Gohara, D.W., Gilligan, D.K., Karelsky, S., **Cameron, C.E.**, and Andino, R. (2003). Manganese-dependent polioviruses caused by mutations within the viral polymerase. **J. Virol.** **77**, 5378-5388.

- [35] Arnold, J.J. and **Cameron, C.E.** (2004). Poliovirus RNA-dependent RNA polymerase (3D<sup>pol</sup>): Pre-steady-state kinetic analysis of ribonucleotide incorporation in the presence of magnesium. **Biochemistry** **43**, 5126-5137.
- [36] Arnold, J.J., Gohara, D.W., and **Cameron, C.E.** (2004). Poliovirus RNA-dependent RNA polymerase (3D<sup>pol</sup>): Pre-steady-state kinetic analysis of ribonucleotide incorporation in the presence of manganese. **Biochemistry** **43**, 5138-5148.
- [37] Gohara, D.W., Arnold, J.J., and **Cameron, C.E.** (2004). Poliovirus RNA-dependent RNA polymerase (3D<sup>pol</sup>): kinetic, thermodynamic, and structural analysis of ribonucleotide selection. **Biochemistry** **43**, 5149-5158.
- [38] de Miranda, J.R., Drebot, M., Tyler, S., Shen, M., **Cameron, C.E.**, Stoltz, D.B., and Camazine, S.M. (2004). Complete nucleotide sequence of Kashmir bee virus and comparison with acute bee paralysis virus. **J. Gen. Virol.** **85**, 2263-2270.
- [39] Huang, L., Sineva, E., Hargittai, M.R.S., Sharma, S.D., and **Cameron, C.E.** (2004). Purification and characterization of hepatitis C virus non-structural protein 5A expressed in *Escherichia coli*. **Protein Expr. Purif.** **37**, 144-153.
- [40] Tackett, A.J., Chen, Y., **Cameron, C.E.**, and Raney K.D. (2005). Multiple full-length NS3 molecules are required for optimal unwinding of oligonucleotide DNA in vitro. **J. Biol. Chem.** **280**, 10797-10806. Epub 2005 Jan 4.
- [41] Belliot, G., Sosnovtsev, S.V., Chang, K.-O., Babu, V., Uche, U., Arnold, J., **Cameron, C.E.**, and Green, K. (2005). Norovirus proteinase-polymerase and polymerase are both active forms of RNA-dependent RNA polymerase. **J. Virol.** **79**, 2393-2403.
- [42] Franco, D., Pathak, H.B., **Cameron, C.E.**, Rombaut, B., Wimmer, E., and Paul, A.V. (2005). Stimulation of poliovirus RNA synthesis and virus maturation in a HeLa cell-free in vitro translation-RNA replication system by viral protein 3CDpro. **Virol. J.** **2**, 86.
- [43] Arnold, J.J., Vignuzzi, M., Stone, J., Andino, R., and **Cameron, C.E.** (2005). Remote-site control of an active site fidelity checkpoint in a viral RNA-dependent RNA polymerase. **J. Biol. Chem.** **280**, 25706-25716. Epub 2005 May 5.
- [44] Huang, L., Hwang, J., Sharma, S.D., Hargittai, M.R., Chen, Y., Reynolds, S., Arnold, J.J., Raney, K.D., and **Cameron, C.E.** (2005). Hepatitis C virus nonstructural protein 5A (NS5A) is an RNA-binding protein. **J. Biol. Chem.** **280**, 36417-36428. Epub 2005 Aug 25.
- [45] Franco, D., Pathak, H.B., **Cameron, C.E.**, Rombaut, B., Wimmer, E., Paul, A.V. (2005). Stimulation of poliovirus synthesis in a HeLa cell-free in vitro translation-RNA replication system by viral protein 3CDpro. **J. Virol.** **79**, 6358-6367.
- [46] Mackintosh, S.G., Lu, J.Z., Jordan, J.B., Harrison, M.K., Sikora, B., Sharma, S.D., **Cameron, C.E.**, Raney, K.D., Sakon, J. (2006). Structural and biological identification of residues on the

- surface of NS3 helicase required for optimal replication of the hepatitis C virus. **J. Biol. Chem.** **281**, 3528-3535. Epub 2005 Nov 22.
- [47] Arnold, J.J., Bernal, A., Uche, U., Sterner, D.E., Butt, T.R., **Cameron, C.E.**, Mattern, M.R. (2006). Small ubiquitin-like modifying protein isopeptidase assay based on poliovirus RNA polymerase activity. **Anal. Biochem.** **350**, 214-221. Epub 2005 Nov 17.
- [48] Vignuzzi, M., Stone, J.K., Arnold, J.J., **Cameron, C.E.**, and Andino, R. (2006). Quasispecies diversity determines pathogenesis through cooperative interactions in a viral population. **Nature** **439**, 344-348. Epub 2005 Dec 4.
- [49] van Ooij, M.J.M., Vogt, D.A., Paul, A., Castro, C., Kuijpers, J., van Kuppeveld, **Cameron, C.E.**, Wimmer, E., Andino, R., and Melchers, W.J.G. (2006). Structural and functional characterization of the coxsackievirus B3 CRE(2C): Role of CRE(2C) in negative and positive strand RNA synthesis. **J. Gen. Virol.** **87**, 103-113.
- [50] Takhampunya, R., Ubol, S., Houng, H.-S., **Cameron, C.E.**, and Padmanabhan, R. (2006). Inhibition of dengue virus replication by mycophenolic acid and ribavirin. **J. Gen. Virol.** **87**, 1947-1952.
- [51] Lanzi, G., de Miranda, J.R., Boniotti, M.B., **Cameron, C.E.**, Lavazza, A., Capucci, L., Camazine, S.M., and Rossi, C. (2006). Molecular and biological characterization of deformed wing virus of honeybees (*Apis mellifera* L.). **J. Virol.** **80**, 4998-5009.
- [52] D'Abramo, C.M., Deval, J., **Cameron, C.E.**, Cellai, L., and Gotte, M. (2006). Control of template positioning during de novo initiation of RNA synthesis by bovine viral diarrhea virus NS5B polymerase. **J. Biol. Chem.** **281**, 24991-24998. Epub 2006 Jun 29.
- [53] Harki, D.A., Graci, J.D., Galarrage, J.E., Chain, W.J., **Cameron, C.E.**, and Peterson, B.R. (2006). Synthesis and antiviral activity of 5-substituted cytidine analogues: Identification of a potent inhibitor of viral RNA-dependent RNA polymerases. **J. Med. Chem.** **49**, 6166-6169.
- [54] Marcotte, L.L., Wass, A.B., Gohara, D.W., Pathak, H.B., Arnold, J.J., Filman, D.J., **Cameron, C.E.**, and Hogle, J.M. (2007). Crystal structure of poliovirus 3CD: Virally-encoded protease and precursor to the RNA-dependent RNA polymerase. **J. Virol.** **81**, 3583-3596. Epub 2007 Jan 24.
- [55] Castro, C., Smidansky, E., Maksimchuk, K.R., Arnold, J.J., Korneeva, V.S., Gotte, M., Konigsberg, W., and **Cameron, C.E.** (2007). Two proton transfers in the transition state for nucleotidyl transfer catalyzed by RNA- and DNA-dependent RNA and DNA polymerases. **Proc. Natl. Acad. Sci (USA)**. **104**, 4267-4272. Epub 2007 Mar 5.
- [56] Pathak H.B., Arnold, J.J., Wiegand, P.N., Hargittai, M.R., and **Cameron, C.E.** (2007). Picornavirus genome replication: assembly and organization of the VPg uridylylation ribonucleoprotein (initiation) complex. **J. Biol. Chem.** **282**, 16202-16213. Epub 2007 Mar 27.

- [57] Korneeva, V.S. and **Cameron, C.E.** (2007). Structure-function relationships of the viral RNA-dependent RNA polymerase: Fidelity, replication speed, and initiation mechanism determined by a residue in the ribose-binding pocket. **J. Biol. Chem.** **282**, 16135-16145. Epub 2007 Mar 29.
- [58] Harki, D.A., Graci, J.D., Edathil, J.P., Castro, C., **Cameron, C.E.**, and Peterson, B.R. (2007). Synthesis of a universal 5-nitroindole ribonucleotide and incorporation into RNA by a viral RNA-dependent RNA polymerase. **ChemBioChem.** **8**, 1359-1362.
- [59] Graci, J.D., Harki, D.A., Korneeva, V.S., Edathil, J.P., Too, K., Franco, D., Smidansky, E.D., Paul, A.V., Peterson, B.R., Brown, D.M., Loakes, D., and **Cameron, C.E.** (2007). Lethal mutagenesis of poliovirus mediated by a mutagenic pyrimidine analog. **J. Virol.** **81**, 11256-11266. Epub 2007 Aug 8.
- [60] Shen, M., Wang, Q., Yang, Y., Pathak, H.B., Arnold, J.J., Castro, C., Lemon, S.M., and **Cameron, C.E.** (2007). Human rhinovirus type 14 gain-of-function mutants for oriI utilization define residues of 3C(D) and 3Dpol that contribute to assembly and stability of the picornavirus VPg uridylylation complex. **J. Virol.** **81**, 12485-12495. Epub 2007 Sep 12.
- [61] Shen, M., Reitman, Z.J., Zhao, Y., Moustafa, I., Wang, Q., Arnold, J.J., Pathak, H.B. and **Cameron, C.E.** (2008) Picornavirus genome replication: Identification of the surface of the poliovirus (PV) 3C dimer that interacts with PV 3Dpol during VPg uridylylation and construction of a structural model for the PV 3C<sub>2</sub>-3Dpol complex. **J. Biol. Chem.** **283**, 875-888.
- [62] Nallagatla, S.R., Hwang, J., Toroney, R., Zheng, X., **Cameron, C.E.** and Bevilacqua, P.C. (2007) 5'-Triphosphate-dependent activation of PKR by RNAs with short stem-loops. **Science** **318**, 1455-1458.
- [63] Moriyama, K., Suzuki, T., Negishi, K., Graci, J.D., Thompson, C.N., **Cameron, C.E.** and Watanabe, M. (2008) Effects of introduction of hydrophobic group on ribavirin base on mutation induction and anti-RNA viral activity. **J. Med. Chem.** **51**, 159-166. Epub 2007 Dec 8.
- [64] Jennings, T.A., Chen, Y., Sikora, D., Harrison, M.K., Sikora, B., Huang, L., Jankowsky, E., Fairman, M.E., **Cameron, C.E.** and Raney, K.D. (2008) RNA unwinding Activity of the hepatitis C virus NS3 helicase is modulated by the NS5B polymerase. **Biochemistry** **47**, 1126-1135. Epub 2008 Jan 8.
- [65] Graci, J.D., Too, K., Smidansky, E.D., Edathil, J.P., Barr, E.W., Harki, D.A., Galarraga, J.E., Bollinger, J.M., Jr., Peterson, B.R., Loakes, D., Brown, D.M. and **Cameron, C.E.** (2008) Lethal mutagenesis of picornaviruses with N6-modified purine nucleoside analogues. **Antimicrob. Agents Chemother.** **52**, 971-979. Epub 2008 Jan 7.
- [66] Sikora, B., Chen, Y., Lichti, C.F., Harrison, M.K., Jennings, T.A., Tang, Y., Tackett, A.J., Jordan, J.B., Sakon, J., **Cameron, C.E.** and Raney K.D. (2008). Hepatitis C Virus NS3 helicase forms oligomeric structures that exhibit optimal DNA unwinding activity in vitro. **J. Biol. Chem.** **283**, 11516-11525. Epub 2008 Feb 18.



- [67] Amero, C., Arnold, J.J., Moustafa, I., **Cameron, C.E.** and Foster, M.P. (2008). Identification of the oriI-binding site of poliovirus 3C protein by nuclear magnetic resonance spectroscopy. **J. Virol.** **82**, 4363-4370. Epub 2008 Feb 27.
- [68] Qi, S., Edathil, J.P., Wu, R., Smidansky, E., **Cameron, C.E.** and Peterson, B.R. (2008). One-pot synthesis of nucleoside 5'-triphosphates from nucleoside 5'-H-phosphonates. **Org. Lett.** **10**, **1703-1706**. Epub 2008 Apr 8.
- [69] Pathak, H.B., Oh, H.S., Goodfellow, I.G., Arnold, J.J., and **Cameron, C.E.** (2008). Picornavirus genome replication: Roles of precursor proteins and rate-limiting steps in oriI-dependent VPg uridylylation. **J. Biol. Chem.** **283**, 30677-30688.
- [70] Arias, A., Arnold, J.J., Sierra, M., Smidansky, E.D., Domingo, E. and **Cameron, C.E.** (2008). Determinants of RNA-dependent RNA polymerase (in)fidelity revealed by kinetic analysis of the polymerase encoded by a foot-and-mouth disease virus mutant with reduced sensitivity to ribavirin. **J. Virol.** **82**, 12346-12355.
- [71] Jennings, T.A., Mackintosh, S.G., Harrison, M.K., Sikora, D., Sikora, B., Tackett, A.J., **Cameron, C.E.** and Raney, K.D. (2009). NS3 helicase from the hepatitis C Virus can function as a monomer or oligomer depending on enzyme and substrate concentrations. **J. Biol. Chem.** **284**, 4806-4814.
- [72] Castro, C., Smidansky, E.D., Arnold, J.J., Maksimchuk, K.R., Moustafa, I., Uchida, A., Götte, M., Konigsberg, W. and **Cameron, C.E.** (2009). Nucleic acid polymerases use a general acid for nucleotidyl transfer. **Nat. Struct. Mol. Biol.** **16**, 212-218.
- [73] Oh, H.S., Pathak, H.B., Goodfellow, I.G., Arnold, J.J., and **Cameron, C.E.** (2009). Insight into poliovirus genome replication and encapsidation obtained from studies of 3B-3C cleavage site mutants. **J. Virol.** **83**, 9370-9387.
- [74] te Velthuis, A.J., Arnold, J.J., **Cameron, C.E.**, van den Worm, S.H., and Snijder, E.J. (2009). The RNA polymerase activity of SARS-coronavirus nsp12 is primer dependent. **Nucleic Acids Res.** **38**, 203-214.
- [75] Wang, Q., Arnold, J.J., Uchida, A., Raney, K.D. and **Cameron, C.E.** (2009). Phosphate release as a rate-limiting step for unwinding by an RNA helicase. **Nucleic Acids Res.** **38**, 1312-1324.
- [76] Matlock, D.L., Yeruva, L., Byrd, A.K., Mackintosh, S.G., Langston, C., Brown, C., **Cameron, C.E.**, Fischer, C.J., and Raney K.D. (2010). Investigation of translocation, DNA unwinding, and protein displacement by NS3h, the helicase domain from the hepatitis C virus helicase. **Biochemistry** **49**, 2097-2109.
- [77] Lodeiro, M.F., Uchida, A.U., Reynolds, S.L., Moustafa, I.M., Arnold, J.J. and **Cameron, C.E.** (2010). Identification of multiple rate-limiting steps during the human mitochondrial transcription cycle in vitro. **J. Biol. Chem.** **285**, 16387-16402.
- [78] Toroney, R., Nallagatla, S.R., Boyer, J.A., **Cameron, C.E.**, and Bevilacqua, P.C. (2010). Regulation of PKR by HCV IRES RNA: Importance of domain II and NS5A. **J. Mol. Biol.** **400**, 393-412.

- [79] Chatterji, U., Lim, P., Bobardt, M.D., Wieland, S., Cordek, D.G., Vuagniaux, G., Chisari, F., **Cameron, C.E.**, Targett-Adams, P., Parkinson, T., Gallay, P.A. (2010). HCV resistance to cyclosporin A does not correlate with a resistance of the NS5A-cyclophilin A interaction to cyclophilin inhibitors. **J. Hepatol.** **53**, 50-56.
- [80] Hsu, N.-Y., Ilnytska, O., Belov, G., Santiana, M., Chen, Y.-H., Takvorian, P., Pau, C., van der Schaar, H., Kaushik-Basu, N., Balla, T., **Cameron, C.E.**, Ehrenfeld, E., van Kuppeveld, F.J.M. and Altan-Bonnet, N. (2010) Viral reorganization of the secretory pathway generates distinct organelles for RNA replication. **Cell** **141**, 799-811.
- [81] Shutt, T.E., Lodeiro, M.F., Cotney, J., **Cameron, C.E.** and Shadel, G.S. (2010). Core human mitochondrial transcription apparatus is a regulated two-component system in vitro. **Proc. Natl. Acad. Sci. (USA)** **107**, 12133-12138.
- [82] Cline, S.D., Lodeiro, M.F., Marnett, L.J., **Cameron, C.E.** and Arnold, J.J. (2010). Arrest of human mitochondrial RNA polymerase transcription by the biological aldehyde adduct of DNA, M1dG. **Nucleic Acids Res.** **38**, 7546-7557.
- [83] Hwang, J., Huang, L., Reynolds, S.L., Kihara, G., Raney, K.D. and **Cameron, C.E.** (2010). Hepatitis C virus nonstructural protein 5A: biochemical characterization of a novel structural class of RNA-binding proteins. **J. Virol.** **84**, 12480-12491.
- [84] Wu, R., Smidansky, E.D., Oh, H.S., Takhampunya, R., Padmanabhan, R., **Cameron, C.E.** and Peterson, B.R. (2010). Synthesis of a 6-methyl-7-deaza analogue of adenosine that potently inhibits polio and dengue viruses. **J. Med. Chem.** **53**, 7958-7966.
- [85] Smidansky, E.D., Arnold, J.J., Moustafa, I.M., Reynolds, S.L. and **Cameron, C.E.** (2011). Human mitochondrial RNA polymerase: evaluation of the single-nucleotide-addition cycle on synthetic RNA/DNA scaffolds. **Biochemistry** **50**, 5016-5032.
- [86] Moustafa, I.M., Shen, H., Morton, B., Colina, C.M., and **Cameron, C.E.** (2011). Molecular dynamics simulations of the viral RNA-dependent RNA polymerase: Conserved and correlated motions of functional elements. **J. Mol. Biol.** **410**, 159-181.
- [87] Dutta, A., Jain, D., **Cameron, C.E.** and Reese, J.C. (2011). Intermolecular interactions within the abundant dead-box protein dhh1 regulate its activity in vivo. **J. Biol. Chem.** **286**, 27454-27470.
- [88] Gazina, E.V., Smidansky, E.D., Holien, J.K., Harrison, D.N., Cromer, B.A., Arnold, J.J., Parker, M.W., **Cameron, C.E.** and Petrou, S. (2011). Amiloride is a competitive inhibitor of coxsackievirus B3 RNA polymerase. **J. Virol.** **85**, 10364-74.
- [89] Graci, J.D., Gnädig, N.F., Galarraga, J.E., Castro C., Vignuzzi, M. and **Cameron C.E.** (2012). Mutational robustness of an RNA virus influences sensitivity to lethal mutagenesis. **J. Virol.** **86**, 2869-2873.

- [90] Davis, W.G., Bowzard, J.B., Sharma, S.D., Wiens, M.E, Ranjan, P., Gangappa, S., Stuchlik, O., Pohl, J., Donis, R.O., Katz, J.M., **Cameron, C.E.**, Fujita, T. and Suryaprakash, S. (2012). The 3'-untranslated regions of influenza genomic sequences are 5'PPP-independent ligands for RIG-I. **PLoS One** **7**, e32661.
- [91] Lodeiro, M.F., Uchida, A., Bestwick, M., Moustafa, I., Arnold, J.J., Shadel, G.S. and **Cameron, C.E.** (2012). Transcription from the second heavy-strand promoter of human mitochondrial DNA is repressed by transcription factor A in vitro. **Proc. Natl. Acad. Sci. (USA)** **109**, 6573-6578.
- [92] Trahey, M., Oh, H.S., **Cameron, C.E.** and Hay, J.C. (2012). Poliovirus infection transiently increases COPII vesicle budding. **J. Virol.** **86**, 9675-9682.
- [93] Lim, P.J., Chatterji, U., Cordek, D., Sharma, S.D., Garcia-Rivera, J.A., **Cameron, C.E.**, Lin, K., Targett-Adams, P. and Gallay, P.A. (2012). Correlation between NS5A dimerization and HCV replication. **J. Biol. Chem.** **287**, 30861-30873.
- [94] Yang, X., Smidansky, E.D., Maksimchuk, K.R., Lum, D., Welch, J.L., Arnold, J.J., **Cameron, C.E.** and Boehr, D.D. (2012). Motif D of viral RNA-dependent RNA polymerases determines efficiency and fidelity of nucleotide addition. **Structure** **20**, 1519-1527.
- [95] Weeks, S.A., Lee, C.A., Zhao, Y., Smidansky, E.D., August, A., Arnold, J.J. and **Cameron, C.E.** (2012). A polymerase mechanism-based strategy for viral attenuation and vaccine development. **J. Biol. Chem.** **287**, 31618-31622.
- [96] Raney, V.M., Reynolds, K.A., Harrison, M.K., Harrison, D.K., **Cameron, C.E.**, and Raney, K.D. (2012). Binding by the hepatitis C virus NS3 helicase partially melts duplex DNA. **Biochemistry** **51**, 7596-7607.
- [97] Shen, H., Moustafa, I., **Cameron, C.E.** and Colina, C. (2012). Exploring the dynamics of four RNA-dependent RNA polymerases by a coarse-grained model. **J. Phys. Chem. B** **116**, 14515-14524.
- [98] Arnold, J.J., Sharma, S.D., Feng, J.Y., Ray, A.S., Smidansky, E.D., Kireeva, M.L., Cho, A., Perry, J., Vela, J., Park, Y., Xu, Y., Tian, Y., Babusis, D., Barauskus, O., Peterson, B.R., Gnatt, A., Kashlev, M., Zhong, W. and **Cameron, C.E.** (2012). Sensitivity of mitochondrial transcription and resistance of RNA polymerase II dependent nuclear transcription to antiviral ribonucleosides. **PLoS Pathog.** **8**, e1003030.
- [99] Nallagatla, S.R., Jones, C.N., Ghosh, S.K., Sharma, S.D., **Cameron, C.E.**, Spremulli, L.L. and Bevilacqua, P.C. (2013). Native tertiary structure and nucleoside modifications suppress tRNA's intrinsic ability to activate the innate immune sensor PKR. **PLoS One**, **8**, e57905. PMC3587421
- [100] Li, S., Ding, X., Guo, F., Chen, Y., Lapsley, M.I., Lin, S.C., Wang, L., McCoy, J.P., **Cameron, C.E.** and Huang, T.J. (2013). An on-chip, multichannel droplet sorter using standing surface acoustic waves. **Anal. Chem.** **85**, 5468-74.

- [101] Panigrahi, R., Hazari, S., Chandra, S., Chandra, P.K., Datta, S., Kurt, R., **Cameron, C.E.**, Huang, Z., Zhang, H., Garry, R.F., Balart, L.A. and Dash, S. (2013). Interferon and ribavirin combination treatment synergistically inhibit HCV internal ribosome entry site mediated translation at the level of polyribosome formation. **PLoS One** **8**, e72791. PMC3751885
- [103] Liu, X., Yang, X., Lee, C.A., Moustafa, I.M., Smidansky, E.D., Lum, D., Arnold, J.J., **Cameron, C.E.** and Boehr, D.D. (2013). Vaccine-derived mutation in motif D of poliovirus RNA-dependent RNA polymerase lowers nucleotide incorporation fidelity. **J. Biol. Chem.** **288**, 32753-65. PMC3820909
- [104] Alphonse, S., Arnold, J.J., Bhattacharya, S., Wang, H., Kloss, B., **Cameron, C.E.**, and Ghose, R. (2014). Cystoviral polymerase complex protein P7 uses its acidic C-terminal tail to regulate the RNA-directed RNA polymerase P2. **J. Mol. Biol.** **426**, 2580-93. PMC4090703
- [105] Liu, Y.C., Kuo, R.L., Lin, J.Y., Huang, P.N., Liu, H., Arnold, J.J., Chen, S.J., Wang, R.Y., **Cameron, C.E.**, and Shih, S.R. (2014). Cytoplasmic viral RNA-dependent RNA polymerase disrupts the intracellular splicing machinery by entering the nucleus and interfering with Prp8. **PLoS Pathog**, **10**, e1004199. PMC4072778
- [106] Cordek, D.G., Croom-Perez, T.J., Hwang, J., Hargittai, M.R.S., Subba-Reddy, C.V., Han, Q., Lodeiro, M.F., Ning, G., McCrory, T.S., Arnold, J.J., Koc, H., Lindenbach, B.D., Showalter, S.A., and Cameron, C.E. (2014). PKA phosphorylation near a polyproline-II motif in HCV NS5A induces and SH3-binding conformation important for viral replication. **J. Biol. Chem.** **289**, 24397-416. PMC4148867
- [107] Korboukh, V.K., Lee, C.A., Vignuzzi, M., Arnold, J.J., Hemperly, S., Graci, J.D., August, A., Andino, R. and **Cameron, C.E.** (2014). RNA population diversity: An optimum for maximal fitness and virulence. **J. Biol. Chem.** **289**, 29531-44. PMC4207971
- [108] Holien, J.K., Gazina, E.V., Elliott, R.W., Jarrott, B., **Cameron, C.E.**, Williams, S.J., Parker, M.W. and Petrou, S. Computational Analysis of Amiloride Analogue Inhibitors of Cocksackievirus B3 RNA Polymerase. **J Proteomics Bioinform.** 2014;Suppl 9:004. PMC4610404
- [109] Li, S., Guo, F., Chen, Y., Ding, X., Li, P., **Cameron, C.E.**, Huang, T.J. (2014). Standing surface acoustic wave (SSAW)-based cell co-culture. **Anal. Chem.** **86**, 9853-9. PMC4188268
- [110] Zafar, M.K., Ketkar, A., Lodeiro, M.F., Cameron, C.E., and Eoff, R.L. (2014). Kinetic analysis of human PrimPol DNA polymerase activity reveals generally error-prone enzyme capable of accurately bypassing 7,8-dihydro-8-oxo-2'-deoxyguanosine. **Biochemistry** **53**, 6584-94. PMC4204878
- [111] Li, S., Ding, X., Mao, Z., Chen, Y., Nama, N., Guo, F., Li, P., Wang, L., Cameron, C.E., and Huang T.J. (2014). Standing surface acoustic wave (SSAW)-based cell washing. **Lab Chip** **15**, 331-8. PMC in process

- [112] Moustafa, I.M., Korboukh, V.K., Arnold, J.J., Smidansky, E.D., Marcotte, L.L., Gohara, D.W., Yang, X., Sanchez-Farran, M.A., Filman, D., Maranas, J.K., Boehr, D.D., Hogle, J.M., Colina, C.M., and **Cameron, C.E.** (2014). Structural dynamics as a contributor to error-prone replication by a RNA-dependent RNA polymerase. **J. Biol. Chem.** 2014 Nov 6 Epub ahead of print
- [113] Yang, S., Slotcavage, D., Mai, J.D., Guo, F., Li, S., Zhao, Y., Lei, Y., **Cameron, C.E.**, and Huang, T.J. (2014). Electrochemically created highly surface roughened Ag nanoplate arrays for SERS biosensing applications. **J. Mater. Chem. C Mater Opt Electron Devices** 2014 Oct 21 Epub ahead of print
- [114] Kolli, S., Meng, X., Wu, X., Shengjuler, D., **Cameron, C. E.**, Xiang, Y., and Deng, J. (2015). Structure-function analysis of vaccinia virus H7 protein reveals a novel phosphoinositide binding fold essential for poxvirus replication. **Journal of Virology** **89**, 2209-2219
- [115] Li, S., Ding, X., Mao, Z., Chen, Y., Nama, N., Guo, F., Li, P., Wang, L., **Cameron, C. E.**, and Huang, T. J. (2015). Standing surface acoustic wave (SSAW)-based cell washing. **Lab on a chip** **15**, 331-338
- [116] Liu, X., Musser, D. M., Lee, C. A., Yang, X., Arnold, J. J., **Cameron, C. E.**, and Boehr, D. D. (2015). Nucleobase but not Sugar Fidelity is Maintained in the Sabin I RNA-Dependent RNA Polymerase. **Viruses** **7**, 5571-5586
- [117] Moustafa, I. M., Gohara, D. W., Uchida, A., Yennawar, N., and **Cameron, C. E.** (2015). Conformational Ensemble of the Poliovirus 3CD Precursor Observed by MD Simulations and Confirmed by SAXS: A Strategy to Expand the Viral Proteome? **Viruses** **7**, 5962-5986
- [118] Moustafa, I. M., Uchida, A., Wang, Y., Yennawar, N., and **Cameron, C. E.** (2015). Structural models of mammalian mitochondrial transcription factor B2. **Biochimica et biophysica acta** **1849**, 987-1002
- [119] Murugesapillai, D., Lodeiro, M. F., James Maher, L., 3rd, **Cameron, C. E.**, and Williams, M. C. (2015). 26 Sequence-specific DNA looping by mitochondrial transcription factor A (TFAM). **Journal of biomolecular structure & dynamics** **33 Suppl 1**, 15-16
- [120] Reynolds, K. A., **Cameron, C. E.**, and Raney, K. D. (2015). Melting of Duplex DNA in the Absence of ATP by the NS3 Helicase Domain through Specific Interaction with a Single-Strand/Double-Strand Junction. **Biochemistry** **54**, 4248-4258
- [121] van der Linden, L., Vives-Adrian, L., Selisko, B., Ferrer-Orta, C., Liu, X., Lanke, K., Ulferts, R., De Palma, A. M., Tanchis, F., Goris, N., Lefebvre, D., De Clercq, K., Leyssen, P., Lacroix, C., Purstinger, G., Coutard, B., Canard, B., Boehr, D. D., Arnold, J. J., **Cameron, C. E.**, Verdagner, N., Neyts, J., and van Kuppeveld, F. J. (2015). The RNA template channel of the RNA-dependent RNA polymerase as a target for development of antiviral therapy of multiple genera within a virus family. **PLoS pathogens** **11**, e1004733

- [122] Van Slyke, G. A., Arnold, J. J., Lugo, A. J., Griesemer, S. B., Moustafa, I. M., Kramer, L. D., **Cameron, C. E.**, and Ciota, A. T. (2015). Sequence-Specific Fidelity Alterations Associated with West Nile Virus Attenuation in Mosquitoes. **PLoS pathogens** **11**, e1005009
- [123] Chan, Y. M., Moustafa, I. M., Arnold, J. J., **Cameron, C. E.**, and Boehr, D. D. (2016). Long-range communication between different functional sites in the picornaviral 3C protein. **Structure** **24**, 509-17.
- [124] Li, S., Ren, L., Huang, P. H., Yao, X., Cuento, R. A., McCoy, J. P., **Cameron, C. E.**, Levine, S. J., Huang, T. J. (2016). Acoustofluidic transfer of inflammatory cells from human sputum samples. **Anal Chem** **88**, 5655-61.
- [125] Woodman, A., Arnold, J. J., **Cameron, C. E.**, and Evans, D. J. (2016). Biochemical and genetic analysis of the role of the viral polymerase in enterovirus recombination. **Nucleic Acids Res** **44**, 6883-95.
- [126] Oran AR, Adams CM, Zhang XY, Gennaro VJ, Pfeiffer HK, Mellert HS, Seidel HE, Mascioli K, Kaplan J, Gaballa MR, Shen C, Rigoutsos I, King MP, Cotney JL, Arnold JJ, Sharma SD, Martinez-Outschoorn UE, Vakoc CR, Chodosh LA, Thompson JE, Bradner JE, **Cameron CE**, Shadel GS, Eischen CM, McMahon SB. (2016). Multi-focal control of mitochondrial gene expression by oncogenic MYC provides potential therapeutic targets in cancer. **Oncotarget**. **7**, 72395-72414.
- [127] Baumgart BR, Wang F, Kwagh J, Storck C, Euler C, Fuller M, Simic D, Sharma S, Arnold JJ, **Cameron CE**, Van Vleet TR, Flint O, Bunch RT, Davies MH, Graziano MJ, Sanderson TP. (2016). Effects of BMS-986094, a Guanosine Nucleotide Analogue, on Mitochondrial DNA Synthesis and Function **Toxicological sciences** **15**, 396-408.
- [128] Griesemer SB, Kramer LD, Van Slyke GA, Pata JD, Gohara DD, **Cameron CE**, Ciota AT. (2016). Mutagen resistance and mutation restriction of St. Louis encephalitis virus. **J Gen Virol**. Dec 12. [Epub ahead of print]
- [129] Yang, X., Liu, X., Musser, D. M., Moustafa, I. M., Arnold, J. J., **Cameron, C. E.**, and Boehr, D. D. (2017). Triphosphate Reorientation of the Incoming Nucleotide as a Fidelity Checkpoint in Viral RNA-dependent RNA Polymerases. **J Biol Chem** **292**, 3810-3826.
- [130] Uchida, A., Murugesapillai, D., Kastner, M., Wang, Y., Lodeiro, M. F., Prabhakar, S., Oliver, G. V., Arnold, J. J., Maher, L. J., Williams, M. C., and **Cameron, C. E.** (2017). Unexpected sequences and structures of mtDNA required for efficient transcription from the first heavy-strand promoter. **eLife** **6**
- [131] Shengjuler, D., Sun, S., Cremer, P. S., and **Cameron, C. E.** (2017). PIP-on-a-chip: A Label-free Study of Protein-phosphoinositide Interactions. **JoVE**
- [132] Murugesapillai, D., Bouaziz, S., Maher, L. J., Israeloff, N. E., **Cameron, C. E.**, and Williams, M. C. (2017). Accurate nanoscale flexibility measurement of DNA and DNA-protein complexes by atomic force microscopy in liquid. **Nanoscale** **9**, 11327-11337.

- [133] Li, S., Ma, F., Bachman, H., **Cameron, C. E.**, Zeng, X., and Huang, T. J. (2017). Acoustofluidic bacteria separation. **J Micromech Microeng.** **27**
- [134] Huang, P. N., Jheng, J. R., Arnold, J. J., Wang, J. R., **Cameron, C. E.**, and Shih, S. R. (2017). UGGT1 enhances enterovirus 71 pathogenicity by promoting viral RNA synthesis and viral replication. **PLoS Pathogens** **13**, e1006375.
- [135] Dulin, D., Arnold, J. J., van Laar, T., Oh, H. S., Lee, C., Perkins, A. L., Harki, D. A., Depken, M., **Cameron, C. E.**, and Dekker, N. H. (2017). Signatures of Nucleotide Analog Incorporation by an RNA-Dependent RNA Polymerase Revealed Using High-Throughput Magnetic Tweezers. **Cell Reports** **21**, 1063-1076.
- [136] Guo, F., Li, S., Caglar, M. U., Mao, Z., Liu, W., Woodman, A., Arnold, J. J., Wilke, C. O., Huang, T. J., and **Cameron, C. E.** (2017). Single-Cell Virology: On-Chip Investigation of Viral Infection Dynamics. **Cell Reports** **21**, 1692-1704.
- [137] Guo, L., Sharma, S. D., Debes, J., Beisang, D., Rattenbacher, B., Louis, I. V., Wiesner, D. L., **Cameron, C. E.**, and Bohjanen, P. R. (2018). The hepatitis C viral nonstructural protein 5A stabilizes growth-regulatory human transcripts. **Nucleic Acids Res.** **46**, 2537-2547.
- [138] Shengjuler, D., Chan, Y. M., Sun, S., Moustafa, I. M., Li, Z. L., Gohara, D. W., Buck, M., Cremer, P. S., Boehr, D. D., and **Cameron, C. E.** (2017) The RNA-Binding Site of Poliovirus 3C Protein Doubles as a Phosphoinositide-Binding Domain. **Structure (London, England : 1993)** **25**, 1875-1886 e1877.
- [139] Arena, G., Cisse, M. Y., Pyrdziak, S., Chatre, L., Riscal, R., Fuentes, M., Arnold, J. J., Kastner, M., Gayte, L., Bertrand-Gaday, C., Nay, K., Angebault-Prouteau, C., Murray, K., Chabi, B., Koechlin-Ramonatxo, C., Orsetti, B., Vincent, C., Casas, F., Marine, J. C., Etienne-Manneville, S., Bernex, F., Lombes, A., **Cameron, C. E.**, Dubouchaud, H., Ricchetti, M., Linares, L. K., and Le Cam, L. (2018) Mitochondrial MDM2 Regulates Respiratory Complex I Activity Independently of p53. **Mol Cell** **69**, 594-609 e598.
- [140] Li, C., Wang, H., Yuan, T., Woodman, A., Yang, D., Zhou, G., **Cameron, C. E.**, and Yu, L. (2018) Foot-and-mouth disease virus type O specific mutations determine RNA-dependent RNA polymerase fidelity and virus attenuation. **Virology** **518**, 87-94.
- [141] Oh, H. S., Banerjee, S., Aponte-Diaz, D., Aligo, J., Lodeiro, M. F. and **Cameron, C. E.** (2018). Multiple poliovirus-induced organelles suggested by comparison of spatiotemporal dynamics of membranous structures and phosphoinositides. **PLoS Pathog.** **14**, e1007036
- [142] Banerjee, S., Aponte-Diaz, D., Yeager, C., Sharma, S.D., Han, Q., Umeda, M., Hara, Y., Wang, R. W. and **Cameron, C. E.** (2018). Control of Multiple Phospholipid Biosynthetic Pathways and Membrane Biogenesis by a Single Picornaviral Protein using Genetically-separable Mechanisms. **PLoS Pathog.** **14**, e1007086

- [143] Gizzi, A. S., Grove, T. L., Arnold, J. J., Jose, J., Jangra, R. K., Garforth, S. J., Du, Q., Cahill, S. M., Dulyaninova, N. G., Love, J. D., Chandran, K., Bresnick, A. R., **Cameron, C. E.** and Almo, S. C. (2018). A naturally occurring antiviral ribonucleotide encoded by the human genome. **Nature** **558**: 610-614.
- [144] Lee, K.M., Gong, Y.N., Hsieh, T.H., Woodman, A., Dekker, N.H., **Cameron, C.E.**, and Shih, S. (2018). Discovery of Enterovirus A71-like nonstructural genomes in recent circulating viruses of the Enterovirus A species. **Emerg Microbes Infect.** 7: 111.
- [145] Fitzsimmons, W., Woods, R. J., McCrone, J. T., Woodman, A., Arnold, J. J., Yennawar, M., Evans, R., **Cameron, C. E.** and Lauring, A. S. (2018). Selection for replicative speed determines the mutation rate and virulence of an RNA virus. **PLoS Biology** **16**, e2006459.

#### Books and Edited Volumes

- [1] **Cameron, C.E.**, Götte, M., and Raney K.D. (2009). *Viral Genome Replication*. Springer Publishers, NY.
- [2] **Cameron, C.E.** and Cline S.D. (2012). Mitochondrial Gene Expression. **Biochimica et Biophysica Acta (BBA)- Gene Regulatory Mechanisms**. Volume 1819, Issues 9-10, 913-1112.

#### Invited Book Chapters

- [1] Leis, J., Bizub, D., Weber, I., **Cameron, C.**, Wlodawer, A., and Skalka, A. (1989). Structure-function analysis of the retroviral aspartic proteinase. In **Current Communications in Molecular Biology: Viral Proteinases as Targets for Chemotherapy**. Krausslich, H., Oroszlan, S., and Wimmer, E., eds. Cold Spring Harbor Press, Cold Spring Harbor, NY, pp. 175-180.
- [2] **Cameron, C.E.**, Burstein, H., Ridky, T., Weber, I.T., Wlodawer, A., Skalka, A.M., and Leis, J. (1995). Identification of amino acid residues of the retroviral aspartic proteinase important for substrate specificity and catalytic efficiency. In **Advances in Experimental Molecular Biology (vol. 362)**. Takahashi, K., ed. Plenum Publishing, New York, NY, pp. 399-406.
- [3] Le Grice, S.F.J., **Cameron, C.E.**, and Benkovic, S.J. (1995). Purification and characterization of human immunodeficiency virus type 1 reverse transcriptase. In **Methods in Enzymology (vol. 262)**. Campbell, J.L., ed. Academic Press, San Diego, CA, pp. 130-147.
- [4] Benkovic, S.J. and **Cameron, C.E.** (1995). Kinetic analysis of nucleotide incorporation and misincorporation by the Klenow fragment of *E. coli* DNA polymerase I. In **Methods in Enzymology (vol. 262)**. Campbell, J.L., ed. Academic Press, San Diego, CA, pp. 257-270.
- [5] **Cameron, C.E.**, Gohara, D.W., and Arnold, J.J. (2002). Poliovirus RNA-dependent RNA polymerase (3Dpol): Structure, function and mechanism. In **Molecular Biology of Picornaviruses**. Semler, B.L. and Wimmer, E., eds. ASM Press, Washington, D.C., pp. 255-267.
- [6] Huang, L., Gledhill, J., and **Cameron, C.E.** (2003). The RNA-dependent RNA polymerase. In **Gene Silencing**. Hannon G., ed. Cold Spring Harbor Press, Cold Spring Harbor, NY., pp. 175-203.



- [7] Korneeva, V., Gohara D.W., and **Cameron, C.E.** (2003). The RNA-dependent RNA polymerase: Structure, function and mechanism. In **Mechanisms of Replication and Transcription of RNA Viruses**. Zhang, X., ed. Research Signpost, Kerala, India, pp. 17-36.
- [8] Graci, J.D. and **Cameron, C.E.** (2005). Lethal mutagenesis: Exploiting error-prone replication of riboviruses for antiviral therapy. In **Antiviral Drug Discovery for Emerging Diseases and Bioterrorism Threats**. Torrence, P.F., ed. John Wiley & Sons, Hoboken, NJ, pp. 203-220.
- [9] Ng, K.K., Arnold, J.J., and **Cameron, C.E.** (2008). Structure-function relationships among RNA-dependent RNA polymerases. In **Current Topics in Microbiology and Immunology**. Paddison P., and Vogt, P., eds. Springer Publishers, NY, pp. 137-156.
- [10] Smidansky, E., Arnold, J.J., Sholders, A., Peersen, O.B., and **Cameron, C.E.** (2008). Nucleic acid polymerase fidelity and viral population fitness. In **Origin and Evolution of Viruses**. Domingo, E., Parrish, C., and Holland, J.J. eds. Academic Press (Elsevier), London, pp. 135-160.
- [11] Boehr, D.D., Arnold, J.J., Moustafa, I.M., and **Cameron, C.E.** (2013). Structure, dynamics and fidelity of RNA-dependent RNA polymerases. In **Nucleic Acid Polymerases**. Murakami, K. and Trakselis, M. eds. Springer Publishers, NY, pp. 309-333.
- [11] Lee, C. A., August, A., Arnold, J. J., and **Cameron, C. E.** (2016). Polymerase Mechanism-Based Method of Viral Attenuation. in **Methods in molecular biology (Clifton, N.J.)**, 2015/10/16 Ed. pp 83-104.
- [12] Gajewski, J. P., Arnold, J. J., Salminen, T. S., Kaguni, L. S., and **Cameron, C. E.** (2016). Expression and Purification of Mitochondrial RNA Polymerase and Transcription Factor A from *Drosophila melanogaster*. in **Methods in molecular biology (Clifton, N.J.)**, 2015/11/05 Ed. pp 199-210.

#### Invited Review Articles

- [1] Leis, J.P. and **Cameron, C.E.** (1994). Engineering proteases with altered specificity. **Curr. Opin. Biotechnol.** **5**, 403-408.
- [2] **Cameron, C.E.** and Castro, C. (2001). The mechanism of action of ribavirin: Lethal mutagenesis of RNA virus genomes mediated by the viral RNA-dependent RNA polymerase. **Curr. Opin. Infect. Dis.** **14**, 757-764.
- [3] Graci, J.D. and **Cameron, C.E.** (2002). Quasispecies, error catastrophe and the antiviral activity of ribavirin. **Virology** **298**, 175-180.
- [4] Hong, Z. and **Cameron, C.E.** (2002). Pleiotropic mechanisms of ribavirin antiviral activities. **Prog. Drug Res.** **59**, 41-69.
- [5] Crotty, S., **Cameron, C.**, and Andino, R. (2002). Ribavirin's antiviral mechanism of action: lethal mutagenesis? **J. Mol. Med.** **80**, 86-95.

- [6] Graci, J.D. and **Cameron, C.E.** (2004). Challenges for the development of ribonucleoside analogues as inducers of error catastrophe. **Antivir. Chem. Chemother.** **15**, 1-13.
- [7] Freistadt, M.S., Meades, G.D., and Cameron, C.E. (2004). Lethal mutagens: Broad-spectrum antivirals with limited potential for development of resistance? **Drug Resist. Updat.** **7**, 19-24.
- [8] Castro, C., Arnold, J.J., and **Cameron, C.E.** (2005). Incorporation fidelity of the viral RNA-dependent RNA polymerase: A kinetic, thermodynamic and structural perspective. **Virus Res.** **107**, 141-149.
- [9] Graci, J.D., and **Cameron, C.E.** (2006). Mechanisms of action of ribavirin against distinct viruses. **Rev. Med. Virol.** **16**, 37-48.
- [10] Graci, J.D. and **Cameron C.E.** (2008) Therapeutically targeting RNA viruses via lethal mutagenesis. **Future Virology** **3**, 553-566.
- [11] **Cameron, C.E.**, Moustafa, I.M. and Arnold, J.J. (2009). Dynamics: The missing link between structure and function of the viral RNA-dependent RNA polymerase? **Curr. Opin. Struct. Biol.** **19**, 768-74.
- [12] Raney, K.D., Sharma, S.D., Moustafa, I.M. and **Cameron, C.E.** (2010). Hepatitis C virus non-structural protein 3 (HCV NS3): A multifunctional antiviral target. **J. Biol. Chem.** **285**, 22725-31.
- [13] **Cameron, C.E.**, Oh, H.S. and Moustafa, I.M. (2010). Expanding knowledge of P3 proteins in the poliovirus lifecycle. **Future Microbiol.** **5**, 867-81.
- [14] Cordek, D.G., Bechtel, J.T., Maynard, A., Kazmierski, W.M. and **Cameron, C.E.** (2011). Targeting the NS5A protein of HCV: an emerging option. *Drugs of the Future* (Prous Thomson Reuters) **36**, 691-711.
- [15] Arnold, J.J., Smidansky E.D., Moustafa, I.M., and **Cameron, C.E.** (2012). Human mitochondrial RNA polymerase: Structure-function, mechanism and inhibition. **Biochim. Biophys. Acta.** **1819**, 948-60.
- [16] **Cameron, C.E.** (2013). Future virology: A mitochondriac's perspective. **Future Virol.** **8**, 933-935.
- [17] Li, S., Kiehne, J., Sinoway, L.I., **Cameron, C.E.** and Huang, T.J. (2013). Microfluidic opportunities in the field of nutrition. **Lab Chip**, **13**, 3993-4003. PMC3875330
- [18] **Cameron, C.E.**, Moustafa, I.M. and Arnold, J.J. (2016). Fidelity of nucleotide incorporation by the RNA-dependent RNA polymerase from poliovirus. **Enzymes** **39**, 293-323.

#### Book Reviews

- [1] **Cameron, C.E.** (1999). A review of: Hepatitis C Protocols. *Methods in Molecular Medicine*, Volume 19 (Edited by Johnson Yiu-Nam Lau). **Quarterly Review in Biology** **74**, 509-510.

**Abstracts:**

(Only abstracts for 2017 are shown; the name of the presenting author is underlined.)

- [1] Anderson, C., Aponte-Diaz, D. and Cameron, C. E. (2017). HRV-C induces PI4P biosynthesis by hijacking the ARF1-GBF1 pathway. **UMBC 20<sup>th</sup> Undergraduate Research Poster Symposium in the Chemical and Biological Sciences.** (Baltimore, MD) (**Poster**)
- [2] Aponte-Diaz D., Banerjee S., Shengjuler D. and Cameron C.E. (2017). Poliovirus 3CD protein induces PI4P synthesis by hijacking the GBF1-Arf1 pathway. **American Society for Virology 36<sup>th</sup> Annual Meeting.** (Madison, WI) (**Talk**)
- [3] Liu, W., Caglar, M. U., Mao, Z., Wilke, C. O., Huang, T. J. and Cameron, C. E. (2017). Mechanistic Differences of Antivirals Revealed by Microfluidics-Based Single-Cell Virology. **21st International Conference on Miniaturized Systems for Chemistry and Life Sciences (μTAS 2017)** (Savannah, USA) (**Poster**)
- [4] Martinez, A., Woodman, A., Arnold, J. J., Liu, X. and Cameron, C. E. (2017)> Mechanism of 'Forced-Copy Choice' Recombination by an Enterovirus Polymerase. **American Society for Virology 36<sup>th</sup> Annual Meeting.** (Madison, WI) (**Poster**)
- [5] Oliver, G. O., Arnold, J. J., Lugo, A. J., Kastner, M, and **Cameron, C. E.** (2017). Biophysical and biochemical characterization of mitochondrial transcription on chimeric and authentic mitochondrial DNA templates. **7<sup>th</sup> Annual Undergraduate Research Symposium.** (University Park, PA) (**Poster**)
- [6] Oliver, G. O., Arnold, J. J., Lugo, A. J., Kastner, M, and **Cameron, C. E.** (2017). Biophysical and biochemical characterization of mitochondrial transcription on chimeric and authentic mitochondrial DNA templates. **UMBC 20<sup>th</sup> Undergraduate Research Poster Symposium in the Chemical and Biological Sciences.** (Baltimore, MD) (**Poster**)
- [7] Wang, Z., Sharma, S. D. and **Cameron, C. E.** (2017) Construction and characterization of a CFP-expressing Poliovirus. **UMBC 20<sup>th</sup> Undergraduate Research Poster Symposium in the Chemical and Biological Sciences.** (Baltimore, MD) (**Poster**)
- [8] Wang, Z., Sharma, S. D., **Cameron, C.E.** (2017) Construction and characterization of a recombinant Poliovirus expressing cyan fluorescent protein. **10<sup>th</sup> Annual Postdoc Research Exhibition,** (University Park, PA) (**Poster**)
- [9] Wang, Z., **Sharma, S.D.** and Cameron, C.E. (2017) Construction and Characterization of a CFP-Tagged Poliovirus. **7<sup>th</sup> Annual Undergraduate Research Symposium,** (University Park, PA) (**Poster**)
- [10] Woodman, A., Fitzgerald F. K. and Cameron C. E. (2017). Recombination in EV71. **American Society for Virology 36<sup>th</sup> Annual Meeting.** (Madison, WI) (**Talk**)

**Service:**

To Pennsylvania State University

1998 - 2002

Graduate Candidacy Exam Committee

1998 & 1999

Admissions Committee, Summer Undergraduate Research Program,  
Life Sciences Consortium

1998 - 1999	Selection Committee, Marker Lectures in Genetic Engineering
1998 & 1999	Judge, Graduate Student Research Exhibition
1999 - 2000	Chair, Selection Committee, Marker Lectures in Genetic Engineering
1999 - 2000	Faculty Search Committee: Host-Microbe Interactions
1999 - 2002	Dean's Committee on "Climate"
2000	Post-tenure Faculty Review Committee
2001 - 2002	Chair, Subcommittee for Junior Faculty Affairs, Climate Committee
2002 - 2007	BMB Climate and Diversity Committee
2002 - present	Honors Advisor
2002 - 2003	Faculty Search Committee: Structural Biology
2002 - 2004	Faculty and Staff Achievement Awards Committee
2003 - 2007	Endowed Positions Search Committee
2003 - present	Honors Student Advisory Committee
7/1/2003 - 6/30/07	ECoS Representative, University Faculty Senate
2003 - 2004	Search Committee for Head of Department of Chemistry
2004 - 2005	Faculty Search Committee: Gene Regulation
2004 - 2006	Dean's Committee on "Vision"
2005 - 2006	Eberly College of Science Summer Outreach Program for grades 4-8
2005 - 2007	BMB Promotion and Tenure Committee
2006 - present	Head then Member, Advisory Committee, X-ray Crystallography Facility, Huck Institute of the Life Sciences
2007 - present	Conferences Advisory Committee, Outreach, Conferences and Institutes
2007	Modular BL3 Building and Design Committee
2007 - 2008	Search Committee for ECoS Directors of Outreach (K-14 & Professional Development)
2007 - 2008	Eberly College of Science Faculty Scholar Medal Nominating Committee
2007 - 2008	Huck Institute of the Life Sciences Promotion and Tenure Committee
1/1/2008 - 12/31/13	Member, Institutional Biosafety Committee
2008 - 2010	University Promotion and Tenure Review Committee
2008 - 2015	Head, Advisory Committee, Electron Microscopy Facility, Huck Institute of the Life Sciences
2009 - 2013	BMMB Graduate Student Recruiting Committee
2009	Eberly College of Science Distinguished Professorship Screening Committee
2009 - 2012	Member, University Selection Committee for Faculty Scholar Medal (Chair, 2011 and 2012)
2010 - present	Member, BMB Department Head Executive Committee
2010 - 2012	Co-chair, Graduate Affairs Committee
2010 - 2015	Member, University Immediate Tenure Review Committee (Chair, 2011-2012 and 2013-2014)
2010 - present	Member, Advisory Committee, Shared Fermentation Facility
2010 - 2015	Member, President's Award Committee for Excellence in Academic Integration (Chair, 2013-2014 and 2014-2015)
2011 - 2012	Junior Faculty Mentoring Committee ( <i>ex officio</i> )
2011 - 2012	Member, BMB Post Tenure Review Committee
2011 - 2012	Co-chair, BMB Faculty Search Committee: Molecular Virology and Prokaryotic Systems Biology
2012 - 2013	Member, Search Committee, Director of the Penn State Hershey Cancer Institute

2013 – 2015	Member, BMB Promotion and Tenure Committee
2013 – 2014	Member, Life Sciences Instrumentation Group, Huck Institutes of the Life Sciences
2013 – 2014	Member, Search Committee, Director of Forensics Program, ECoS
2014	Member, Strategic Planning Advisory Committee, ECoS
2014 – 2015	Member, Search Committee, Dean of Eberly College of Science, PSU
2014 – 2015	Member, Search Committee, BSL3 Pathogens, Huck/ECoS/AgSci
2015 – 2016	Co-chair, Search Committee, BSL3 Virologist, BMB/Huck
2016 – present	Member, Advisory Committee, Genomics Core Facility
2016 – present	Chair, Institutional Review Entity, Office of Research Protections
2017 – present	Member, Search Committee, Director of the Huck Institutes of the Life Sciences
2017 – present	Member, Faculty Advisory Committee, Center of Excellence in Industrial Biotechnology
2018 – 2019	Member, BMB Promotion and Tenure Committee
2018 – 2019	Member, BMB Faculty Search Committee

### To Profession

1998 - 2012	Member, Congressional Liaison Committee, Joint Steering Committee for Public Policy (aka Coalition for the Life Sciences)
1999	Organizer, Symposium on “ <i>Understanding Biological Pathways: A Biophysical Perspective</i> ,” held on May 28, 1999, at Pennsylvania State University and sponsored by the Eberly College of Science, Bristol-Myers Squibb and SmithKline Beecham
1999	Chair, Workshop on Caliciviruses and Astroviruses (I), American Society for Virology 19 <sup>th</sup> Annual Meeting, Fort Collins, CO
2000	Member ( <i>ad hoc</i> ), International and Cooperative Projects Study Section, Center for Scientific Review, National Institutes of Health
2001	Co-Organizer, Penn State’s 20 <sup>th</sup> Summer Symposium in Molecular Biology, “Emerging Viral Disease”, June 13-16.
2001 - 2005	Member, International and Cooperative Projects Study Section, Center for Scientific Review, National Institutes of Health
2001 - present	<i>Ad hoc</i> reviewer for National Science Foundation (grants)
2002	Member, Special Emphasis Panel Technical Evaluation Group: Drug Development for Opportunistic Infections-Hepatitis C, DAIDS/NIAID/NIH
2002 - 2003	<i>Ad hoc</i> reviewer for Ohio Cancer Research Associates (grants)
2002	Member, Membership Task Force, American Society for Biochemistry and Molecular Biology
2002	Member, Special Emphasis Panel Technical Evaluation Group: Impact of Microbial Interactions on Infectious Diseases, DMID/NIAID/NIH
2002	<i>Ad hoc</i> reviewer for Louisiana Board of Regents (grants)
2002 - 2005	Chair, Local Organizing Committee, 2005 Annual Meeting of the American Society for Virology
2003	Member, Special Emphasis Panel Technical Evaluation Group: National Biocontainment Laboratories, DMID/NIAID/NIH
2003	Member, Special Emphasis Panel Technical Evaluation Group: Regional

Biocontainment Laboratories, DMID/NIAID/NIH

7/1/2003-6/30/2008	
7/1/2010-9/30/2015	
7/1/2017-6/30/2022	Member, Editorial Board, <i>J. Biol. Chem.</i>
2003	Member ( <i>ad hoc</i> ), Virology Study Section, Center for Scientific Review, NIH
1/1/2004-12/31/2018	Member, Editorial Board, <i>J. Virol.</i>
2004	Member, Special Emphasis Panel Technical Evaluation Group: Biodefense and Emerging Infectious Disease Research Opportunities, NIAID/NIH
2004 – 2010	Member (appointed), Education and Professional Development Committee, American Society for Biochemistry and Molecular Biology
2004 – 2008	Member (appointed), Minority Affairs Committee, American Society for Biochemistry and Molecular Biology
2004	Chair, Workshop on Antivirals and Interferons (I), American Society for Virology 23 <sup>rd</sup> Annual Meeting, Montreal, Quebec, Canada
8/30/2004	Member, Panel for discussion of public access to NIH-sponsored research, convened by Dr. Elias A. Zerhouni, Director, National Institutes of Health
2005	Member, Special Emphasis Panel Technical Evaluation Group: Centers for Hepatitis C Research
2005 – 6/30/2009	Member, Molecular Genetics A Study Section, Center for Scientific Review, NIH
2005	Chair, Session on: Cis-acting RNA elements and trans-acting factors, European Study Group on the Molecular Biology of Picornaviruses, Lunteren, The Netherlands
2005	Invited Participant, NRC Workshop: Role of an Antiviral Compound in the Global Poliovirus Eradication Initiative
2006	Member, Special Emphasis Panel Technical Evaluation Group: Partnerships for Hepatitis C Vaccine Development
2006	Thrust Area Manager, Mitigation and Treatment Thrust Area, BioTech Master-Class Workshop, Defense Threat Reduction Agency, Fort Belvoir, VA
2006	Convener, ASBMB Award Ceremony for Exemplary Contributions to Education, American Society for Biochemistry and Molecular Biology Annual Meeting, San Francisco, CA
2007	Convener, ASBMB Award Ceremony for Exemplary Contributions to Education, American Society for Biochemistry and Molecular Biology Annual Meeting, Washington, DC
2007	Chair, Session on Infectious Diseases in Minority Populations: Hepatitis C, American Society for Biochemistry and Molecular Biology Annual Meeting, Washington, DC
2007	Chair, Session on Functional Analysis of Virus Proteins, Eighth International Symposium on Positive-strand RNA Viruses, Washington, DC
2007	Chair, Workshop on Innate Immunity (II) – New Twists on Virus-Host Interactions, American Society for Virology 26 <sup>th</sup> Annual Meeting, Corvallis, OR
2007	Member, Training and Career Opportunities Subcommittee, FASEB
7/1/07 – 6/30/13	Member, ASBMB Today Editorial Advisory Board

- 7/1/08 – 6/30/09  
2008 Chair-Elect, Division T (RNA Viruses) of the American Society for Microbiology  
Convener, ASBMB Award Ceremony for Exemplary Contributions to  
Education, American Society for Biochemistry and Molecular Biology Annual  
Meeting, San Diego, CA
- 2008 Co-Chair, Session on Integrating Discovery and Application, American  
Society for Biochemistry and Molecular Biology Annual Meeting,  
Washington, DC
- 2008 Chair, Session F: Genome replication and gene expression – 1, European  
Study Group on the Molecular Biology of Picornaviruses, Barcelona, Spain
- 2008 Chair, Workshop on RNA Virus Replication & Gene Expression II,  
American Society for Virology 27<sup>th</sup> Annual Meeting, Ithaca, NY
- 2008 – 2011 Chair, Minority Affairs Committee,  
American Society for Biochemistry and Molecular Biology
- 2008 – 2011 Member (*ex officio*, non-voting), Council,  
American Society for Biochemistry and Molecular Biology
- 11/18/08 – 6/30/13 Member, Board of Scientific Counselors, National Institute of Diabetes and  
Digestive and Kidney Diseases, NIH
- 2009 Chair, Session on HIV: Activation and Anatonism of Host Defense,  
American Society for Biochemistry and Molecular Biology Annual  
Meeting, New Orleans, LA
- 7/1/09 – 6/30/10  
2009 – 2010 Chair, Division T (RNA Viruses) of the American Society for Microbiology  
Thematic Organizer, Hypertension: Mechanisms, Therapies and Disparities,  
American Society for Biochemistry and Molecular Biology Annual  
Meeting (2010), Anaheim, CA
- 7/15/09 – 7/16/12 Councilor for Animal Virology, American Society for Virology
- 2009-2013  
2014-2018 Member, Editorial Board, *Viruses*
- 2009 Chair, Workshop on Hepatitis Viruses, American Society for Virology 28<sup>th</sup>  
Annual Meeting, Vancouver, BC, Canada
- 2009 Member, 2012 Keystone Symposia Biochemistry/Structural Biology Study  
Group
- 2009 – 2011 Thematic Organizer, Obesity, American Society for Biochemistry and  
Molecular Biology Annual Meeting (2011), Washington, DC
- 2009 – 2011 Co-organizer, Viral Genome Replication Meeting (sponsored by ASM),  
February 2011, Banff, Alberta, Canada
- 2011 – 2012 Guest Editor, Special issue: The Regulation of Mitochondrial Gene  
Expression, BBA – Gene Regulatory Mechanisms
- 7/1/10 – 6/30/11  
2011 – 2012 Councilor for Division T (RNA viruses), American Society for Microbiology  
Past Chair, Minority Affairs Committee,  
American Society for Biochemistry and Molecular Biology
- 2011 Discussion Leader, Virus Nanomachines: Structure and Catalysis, Viruses &  
Cells Gordon Conference, Lucca (Barga), Italy
- 2011 Member and Co-chair, Special Emphasis Panel, Cell Biology IRG, Center for  
Scientific Review, NIH
- 2011 – 2012 Member, Nominations Committee, American Society for Virology
- 2012 Member, Site Visit Review Team, Laboratory of Emerging Pathogens, Center  
for Biologics Evaluation and Research, US FDA

- 2012 Member, Special Emphasis Panel (ZAI1 UKS-M (M2) 1), DEA/NIAID/NIH
- 2012 Member, Panel for review of the Biological Chemistry Graduate Program and Chemistry Training Track, UT Southwestern Graduate School of Biomedical Sciences, Dallas, TX
- 2012 – 2015 Member (elected), Public Affairs Advisory Committee, American Society for Biochemistry and Molecular Biology
- 2012 Co-chair, Session on: Eradication and antiviral strategies: Antivirals, European Study Group on the Molecular Biology of Picornaviruses, St. Raphaël, France
- 2012 Chair, Workshop on Antivirals and Therapeutic Interferons (I), American Society for Virology 31<sup>st</sup> Annual Meeting, Madison, WI
- 2012 – 2014 Thematic Organizer, Mitochondria & Metabolism, American Society for Biochemistry and Molecular Biology Annual Meeting (2014), San Diego, CA
- 2013 Co-chair, Virology workshop: RNA – so much more than a genome 2013 Meeting of the Society for General Microbiology, Manchester, UK
- 2013 Chair, Workshop on Virus-Host Interactions: Positive Strand RNA Viruses (III), American Society for Virology 32<sup>nd</sup> Annual Meeting, University Park, PA
- 2014 – present Member, Advisory Committee, Research Center for Emerging Viral Infections, Chang Gung University, Tao Yuan, Taiwan
- 2014 – 2015 Advisor, Graduate Student Public Affairs Committee (GSPAC), American Society for Biochemistry and Molecular Biology
- 8/8/2014 – 6/14/2018 Member, National Science Advisory Board for Biosecurity, Office of the Director, National Institutes of Health
- 10/2014 – 11/2015 Organizer, Fifth Annual Translational Research In Mitochondria, Aging and Disease (TRiMAD) 2015, State College, PA
- 2015 Discussion Leader, Transcription and Translation, Viruses & Cells Gordon Conference, Girona, Spain
- 8/2015 – 7/2017 Member, Editorial Board, *Mitochondrion*
- 7/1/2016 – present Member, Molecular Genetics B Study Section, Center for Scientific Review, NIH
- 2017 Member, Panel for review of the Biological Chemistry Graduate Program, UT Southwestern Graduate School of Biomedical Sciences, Dallas, TX
- 2018 – present Member, Editorial Board, *JoVE Biochemistry*
- 2019 Discussion Leader, Viruses & Cells Gordon Conference, Lucca (Barga) Italy

To Industry

- 2000 Consultant (contracted) for Antiviral Therapy, Schering-Plough Research Institute, Kenilworth, NJ
- 2000 Consultant (contracted) for Biochem Pharma, Inc., Laval, Quebec, Canada
- 2001 – 2003 Consultant (contracted) for Discovery Research, ICN Pharmaceuticals, Costa Mesa, CA
- 2003 Consultant (ad hoc) for Ribapharm, Inc., Costa Mesa, CA
- 2003 – 2006 Consultant (contracted) Migenix (formerly Micrologix Biotech, Inc.), Vancouver, British Columbia, Canada
- 2003 – 2004 Consultant (contracted) Akros Pharma, Inc. Princeton, NJ



2004 – 2006 Consultant (ad hoc) Valeant Pharmaceuticals International (formerly Ribapharm), Costa Mesa, CA

2005 Consultant, Pfizer Global Research and Development, La Jolla, CA

2006 – 2008 Consultant (ad hoc), Genelabs Technologies, Inc., Redwood City, CA

2007 Consultant (ad hoc), XTL Biopharmaceuticals Ltd., Valley Cottage, NY

2008 Consultant (contracted) Merck Research Laboratories, West Point, PA

2008 Consultant (contracted) InterMune, Brisbane, CA

2009, 2011, 2013 Consultant (contracted) Gilead Sciences, Inc., Foster City, CA

2009 Consultant (contracted) Roche Palo Alto LLC, Palo Alto, CA

2010 Consultant (contracted) Merck Frosst, Montreal, Quebec, Canada

2010 Consultant (contracted) GlaxoSmithKline LLC, Research Triangle Park, NC

2012 Consultant (contracted) BioCryst Pharmaceuticals, Inc., Birmingham, AL

2012 – 2013 Consultant (contracted) Bristol-Myers Squibb Company, Princeton, NJ

2013 Consultant (contracted) Alios Biopharma, San Francisco, CA

2013 Consultant (contracted) PTC Therapeutics, South Plainfield, NJ

2014 – 2016 Consultant (contracted) Finnegan, Henderson, Farabow, Garrett & Dunner LLP, Washington, DC

2015 – present Consultant (contracted) Latham & Watkins LLP, Washington, DC

2015 – present Consultant (contracted) Abbvie, North Chicago, IL

2016 – present Consultant (contracted) Atea Pharmaceuticals, Inc., Boston, MA