

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, Viral attenuation and vaccine development, Picornavirus genome replication, Biochemical mechanisms and biological functions of HCV NS3 and NS5a proteins, Mitochondrial transcription and disease, and Lethal mutagenesis as an antiviral strategy.

Honors and Awards:

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

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./in progress
Taylor Croom	Ph.D./in progress
Sravani Banerjee	Ph.D./in progress
Djoshkun Shengjuler	Ph.D./in progress
Yao Wang	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 – 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 - present

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: 07/01/03-01/31/18
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: 01/01/15-12/31/17
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: 07/01/15-05/31/18
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.)

Sep. 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.

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^{pol}): 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 – 18th 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”
10th 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”
11th 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
October 2014, Chang Gung University, 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

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 23rd 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”
1st 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
- [80] "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

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

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 α -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^{pol}) 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^{pol}) 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^{pol}): 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^{pol}): 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^{pol}): 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- β -D-ribofuranosyl-3-nitropyrrole. **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.**, Kalkmakoff, 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^{pol}): 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^{pol}): 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^{pol}): 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 3C₂-3Dpol 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] 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
- [109] 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
- [110] 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
- [111] 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

- [112] 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
- [113] 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
- [114] 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
- [115] 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
- [116] 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
- [117] 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
- [118] 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
- [119] 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
- [120] 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.**, Verdaguer, 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
- [121] 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
- [122] Lee, C.A., August, A., Arnold, J.J., and **Cameron C.E.** (2016) Polymerase mechanism-based method of viral attenuation. **Methods Mol Biol** 1349, 83-104.

- [123] Gajewski, J. P., Arnold, J.J., Salminen, T. S., Kaguni, L. S., and **Cameron, C. E.** (2016) Expression and purification of of mitochondrial RNA polymerase and transcription factor A from *Drosophila melanogaster*. **Methods Mol Biol** 1351, 199-210.
- [124] 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.
- [125] 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.
- [126] 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** 2016 Jun 17 [Epub ahead of print]

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.

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 2015 are shown; the first author is the presenting author is underlined.)

- [1] Arnold, J.J., Woodman, A., Son, Y.G., Evans, D.J. and **Cameron, C.E.** (2015). Mechanism of RNA virus recombination. **Viruses and Cells Gordon Research Conference.** (Girona, Spain) (**Poster**)
- [2] Dulin, D., van Laar, T., Arnold, J.J., **Cameron, C.E.**, Depken, M. and Dekker, N.H. (2015). Single-Molecule Studies of the RNA-Dependent RNA Polymerase from Poliovirus . **Viruses and Cells Gordon Research Conference.** (Girona, Spain) (**Talk**)
- [3] Shengjuler, D., Sun, S., Chan, Y.M., Banerjee, S., Moran, J.M., Uchida, A., Moustafa, I.M., Arnold, J.J., Hsu, N.Y., Altan-Bonnet, N, Boehr, D.D., Cremer P.S. and **Cameron C.E.** (2015). Studies of a picornaviral phosphatidylinositol-phosphate-binding proteins. **Viruses and Cells Gordon Research Conference.** (Girona, Spain) (**Poster**)
- [4] **Cameron, C.E.**, Cordek, D.G., Sharma, S.D., Arnold, J.J., Klumpp, K., Evans, M., Meulman, P., Lindenbach, B.D. and Rountree, C.B. (2015). New, functional forms of HCV NS5A protein in vivo? **HCV 2015: Annual International Symposium on Hepatitis C Virus and Related Viruses.** (Strasbourg, France) (**Poster**)
- [5] Arnold, J.J., Woodman, A., Son, Y.G., Evans, D.J. and **Cameron, C.E.** (2015). Mechanism of RNA virus recombination. **Mini-Symposium on Vaccines** (Harbin, China) (**Talk**)
- [6] X. Liu, X. Yang, D.M. Musser, J.J. Arnold, **C.E. Cameron**, D.D. Boehr (2015). The nucleotide selection mechanism of poliovirus RNA-dependent RNA polymerase. *2nd PSU Intercampus Virology Meeting* (University Park, PA) (**Talk**)
- [7] X. Liu, X. Yang, D.M. Musser, J.J. Arnold, **C.E. Cameron**, D.D. Boehr (2015). Miscoordination of conformational change in fidelity variants of viral RNA-dependent RNA polymerase. *The 2015 Annual Meeting of the American Society of Biochemistry and Molecular Biology* (Boston, MA) (**Poster**)
- [8] [5] **Cameron. C.E.**, Cordek D.G., Sharma., S.D., Arnold, J.J., Klumpp, K., Evans, M., Meuleman P., Lindenbach, B.D., and Rountree, B.C. (2015) New, functional forms of HCV NS5A protein in vivo? **22nd International Symposium on Hepatitis C Virus and related viruses** (Strasbourg, France) (Poster)
- [9] Sharma, S.D., Beisang, D., Guo, L., Debes, J., Vlasova, I., Arnold, J.J., Bohjanen, P., **Cameron, C.E.** (2015) The hepatitis C virus NS5A protein antagonizes human transcripts that control cell growth and apoptosis by binding to GU-rich elements. **22nd International Symposium on Hepatitis C Virus and related viruses** (Strasbourg, France) (Talk)
- [10] Sharma, S.D., Monteleon, C., Prabhakar, S., Lodeiro, F., Sondheimer, N.J, Ridky, T.W., and **Cameron, C.E.** (2015) mtDNA mutations and cancer: a prospective analysis. **5th Regional Translational Research in Mitochondria, Aging, and Disease Symposium** (University Park, PA) (Poster)
- [11] **Ibrahim M. Moustafa**, Akira Uchida, Yao Wang, Neela Yennawar, and **Craig Cameron.** (2015). Structural models of mammalian transcription factor B2. **5th Regional Translational Research in Mitochondria, Aging, and Disease Symposium** (PSU, University Park, PA) (**Poster**)

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, 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 - present	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, Steering 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

To Profession

1998 - 2012 Member, Congressional Liaison Committee, Joint Steering Committee for Public Policy (aka Coalition for the Life Sciences)
 1999 Organizer, Symposium on “*Understanding Biological Pathways: A Biophysical Perspective*,” 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 19th Annual Meeting, Fort Collins, CO
 2000 Member (*ad hoc*), International and Cooperative Projects Study Section, Center for Scientific Review, National Institutes of Health
 2001 Co-Organizer, Penn State’s 20th 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 *Ad hoc* 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 *Ad hoc* 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 *Ad hoc* 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 Member, Editorial Board, *J. Biol. Chem.*
- 2003 Member (*ad hoc*), Virology Study Section, Center for Scientific Review, NIH
1/1/2004-12/31/2018 Member, Editorial Board, *J. Virol.*
- 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 23rd 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 26th 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 th Annual Meeting, Ithaca, NY
2008 – 2011	Chair, Minority Affairs Committee, American Society for Biochemistry and Molecular Biology
2008 – 2011	Member (<i>ex officio</i> , 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, <i>Viruses</i>
2009	Chair, Workshop on Hepatitis Viruses, American Society for Virology 28 th 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, 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 st 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 nd Annual Meeting, University Park, PA
2014 – present	Member, Advisory Committee, Research Center for Emerging Viral Infections, Chang Gung University, Tao Yuan, Taiwan
2014 – present	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
8/2015 – present	Member, Editorial Board, <i>Mitochondrion</i>
7/1/2016 – present	Member, Molecular Genetics B Study Section, Center for Scientific Review, NIH

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