

CURRICULUM VITAE**ROY CURTISS III**

Professor of Life Sciences, School of Life Sciences
Arizona State University, Tempe, AZ 85287

BIRTHDATE: May 27, 1934**BIRTHPLACE:** New York, NY**NATIONALITY:** USAEDUCATION

B.S.	Agriculture	Cornell University, Ithaca, NY	1956
Ph.D.	Microbiology	University of Chicago, Chicago, IL	1962

PROFESSIONAL CAREER

2010-Present Director, Center for Microbial Genetic Engineering, Arizona State University, Tempe, AZ
 2007-Present Director, Center for Infectious Diseases and Vaccinology, Arizona State University, Tempe, AZ
 2004-2006 Co-Director, Center for Infectious Diseases and Vaccinology, Arizona State University, Tempe, AZ
 2004-Present Professor of Life Sciences, School of Life Sciences, Arizona State University, Tempe, AZ
 2005-Present George William and Irene Koechig Freiberg Professor of Biology Emeritus, Washington University, St. Louis, MO
 1984-2005 George William and Irene Koechig Freiberg Professor of Biology, Washington University, St. Louis, MO
 1983-2005 Professor, Department of Biology, Washington University, St. Louis, MO
 1993-2000 Founder, Member Board of Directors, MEGAN Health, Inc., St. Louis, MO
 1998-1999 Vice President of Research, MEGAN Health, Inc., St. Louis, MO
 1991-1994 Professor/Collaborator, Iowa State University, Ames, IA
 1991-1994 Director, Center for Plant Science & Biotechnology, Washington University, St. Louis, MO
 1983-1993 Chairman, Department of Biology, Washington University, St. Louis, MO
 1983-1991 Professor, Cellular and Molecular Biology, Washington University School of Dental Medicine, St. Louis, MO
 1983-1987 Adjunct Professor, Department of Microbiology, University of Alabama at Birmingham, Birmingham, AL
 1982-1983 Acting Chairman, Department of Microbiology, University of Alabama at Birmingham, Birmingham, AL
 1981-1982 Vice Chairman, Department of Microbiology, University of Alabama at Birmingham, Birmingham, AL
 1981-1983 Director & Senior Scientist, Cystic Fibrosis Research Center, University of Alabama at Birmingham, Birmingham, AL
 1978-1983 Charles H. McCauley Professor of Microbiology, University of Alabama at Birmingham, Birmingham, AL
 1972-1983 Senior Scientist, Institute of Dental Research, University of Alabama at Birmingham, Birmingham, AL
 1972-1983 Senior Scientist, Comprehensive Cancer Center, University of Alabama at Birmingham, Birmingham, AL
 1972-1983 Professor, Department of Microbiology, University of Alabama at Birmingham, Birmingham, AL
 1971-1972 Interim Director, University of Tennessee - Oak Ridge Graduate School of Biomedical Sciences, Oak Ridge, TN
 1970-1971 Associate Director, University of Tennessee - Oak Ridge Graduate School of Biomedical Sciences, Oak Ridge, TN
 1969-1972 Professor, University of Tennessee - Oak Ridge Graduate School of Biomedical Sciences, Oak Ridge, TN
 1969-1972 Group Leader, Microbial Genetics and Radiation Microbiology Group, Biology Division, Oak Ridge National Laboratory, Oak Ridge, TN
 1967-1969 Lecturer, University of Tennessee - Oak Ridge Graduate School of Biomedical Sciences, Oak Ridge, TN
 1965-1972 Lecturer, Department of Microbiology, University of Tennessee, Knoxville, TN
 1963-1972 Biologist, Biology Division, Oak Ridge National Laboratory, Oak Ridge, TN
 1960-1962 US Public Health Service Predoctoral Fellow, Department of Microbiology, University of Chicago, Chicago, IL
 1958-1960 University Fellow, Department of Microbiology, University of Chicago, Chicago, IL
 1956-1958 Junior Technical Specialist, Biology Division, Brookhaven National Laboratory, Upton, NY
 1955-1956 Laboratory Instructor and Research Assistant, Department of Poultry Husbandry, Cornell University, Ithaca, NY

PROFESSIONAL ACTIVITIESArizona State University, Tempe, AZ

2011-Present Member, Research and Collaboration Advancement Team, The Biodesign Institute
 2010-2011 Member, Microbial Ecology Search Committee, SoLS
 2009-2010 Chairman, Microbiology and Immunology Search Committee, SoLS
 2008-2009 Member, Strategic Planning Committee, SoLS
 2008 Member, Septennial Review Committee, SoLS
 2007-2009 Member, Directorate, The Biodesign Institute
 2007-2008 Member, Department of Animal Care and Technologies Director Search Committee
 2006-2007 Member, Graduate School Committee on Interdepartmental Transdisciplinary Graduate Education
 2005-2007 Member, School of Life Sciences Executive Committee
 2005 Member, Neurosciences Search Committee
 2005 Chairman, Bacterial Pathogenesis Search Committee, SoLS
 2004 Member, Mycobacterial Pathogenesis Search Committee, SoLS

Washington University, St. Louis, MO

1998-2004 Member, Center for Infectious Disease Research Advisory Board
 1994-1998 Member, Department of Biology Advisory Committee
 1991-1992 Member, Division Comparative Medicine Chairman Search Committee
 1991-1993 Member, Animal Studies Committee
 1989-1993 Member, Biotechnology Advisory Board
 1989-1991 Member, Committee to Prepare for the 21st Century
 1989-1991 Member, Psychology Chairman Search Committee
 1988-1993 Member, Washington University Committee on AIDS
 1988-1994 Member, Executive Committee, Center for Plant Science and Biotechnology
 1985-1988 Chancellor's Representative to Board of Directors of the Missouri Botanical Garden
 1985-1991 Member, Biosafety Committee
 1984-1986 Member-at-Large, Senate Council
 1984-1993 Chairman, Tyson Research Center Advisory Committee
 1983-1993 Member, Executive Council, Division of Biology and Biomedical Sciences
 1983-1984 Member, Faculty of Arts and Sciences Dean Search Committee

Northeast Biodefense Center (NBC), New York, NY

2011-Present Member, Scientific Advisory Board

Bacilligen, Inc., Rockville, MD

2007-2011 Board of Advisors

Midwest MRCE Scientific Advisory Committee

2003-2004 Member

American Type Culture Collection, Manassas, VA

2003-Present Presidential Advisor

Missouri Seed Capital Investment Board, Jefferson City, MO

2000-2003 Member

Apovia (EVAX) Technologies, Inc., Munich, Germany

1999-2002 Science Advisor

Whitfield School, St. Louis, MO

2002-2005 Executive Committee of the Board of Directors

1997-2005 Board of Directors

Ajinomoto Company, Inc., Tokyo, Japan

1997-1998 Science Advisor

MEGAN Health Inc., St. Louis, MO

1998-1999 Vice President of Research

1992-1999 Science Advisor

1989-2000 Board of Directors

1989 Founder

Immuno A.G., Vienna, Austria

1991-1994 Science Advisor

Vicam, Cambridge, MA

1991-1993 Science Advisor

Agrigenetics, Madison, WI

1989-1991 Science Advisor

Mycogen Corporation, La Jolla, CA

1988-1989 Science Advisor

Crop Genetics International, Hanover, MD

1987-1990 Science Advisor

Sungene Technologies Corporation, San Jose, CA

1987-1989 Board of Directors

1982-1989 Science Advisor

Praxis Biologics, Inc., Rochester, NY

1985-1988 Science Advisor

Molecular Engineering Associates, Inc., Birmingham, AL

1983-1987 Science Advisor

1981-1984 Board of Directors

1981 Founder

University of Alabama at Birmingham, Birmingham, AL

1981-1982 Member, Biochemistry Chairman Search Committee

1980-1983 Member, Joint Health Sciences Faculty Status Committee

1979-1983 Member, Graduate School Advisory Committee

1979-1981 Member, Comprehensive Cancer Center Review Committee

1977 Member, Graduate School Dean Search Committee

1976-1983 Program Director, Infectious Diseases Postdoctoral Training Program

1976-1983 Member, Promotions Committee, Department of Microbiology

1975-1983 Program Director, Molecular, Cellular and Medical Genetics Postdoctoral Training Program

1974-1983 Member, Biosafety Committee

1973-1982 Program Director, Molecular Cell Biology Graduate Program

1973-1982 Chairman, Molecular Cell Biology Graduate Committee

1973-1975;

1976-1978 Member, Cancer Research and Training Center Review Committee

1973-1983 Member, Graduate School Council

1973-1975 Chairman, Graduate Committee, Department of Microbiology

1972-1975 Member, Graduate Committee, Department of Microbiology

1972-1975 Member, Coordinating Council, Department of Microbiology

University of Tennessee, Knoxville, TN

1971-1972 Member, Biomedical Engineering Institute Committee

University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, Oak Ridge, TN

1971-1972 Program Director, NIGMS Cellular and Molecular Biology Training Grant
 1969-1971 Chairman, Genetics Curriculum Committee
 1969-1971 Member, Postdoctoral Investigatorship Review Committee

Biology Division, Oak Ridge National Laboratory, Oak Ridge, TN

1966-1969 Chairman, Genetics Seminar and Journal Club Committee

NATIONAL AND INTERNATIONAL ACTIVITIES

2013 Member, International Scientific Advisory Committee (ISAC) for the 16th International Congress of Mucosal Immunology (ICMI 2013)
 2013-Present Member, Vaccine Council of 100
 2012-Present Member, External Advisory Committee, Public Health Preparedness for Infectious Diseases Program (PHPID) at the Ohio State University
 2012 Member, NIH Topics in Microbial Diseases Study Section
 2012-Present Member, The American Association of Immunology (AAI)
 2011-Present Member, Bill and Melinda Gates Foundation, Grand Challenges Explorations Review Panel, Rounds 6-9
 2011-Present Member, National Research Council (NRC) Standing Committee for the Review of Food Safety and Defense Risk Assessments, Analyses and Data
 2011-Present Member, Scientific Advisory Board, Northeast Biodefense Center (NBC)
 2010 Member, Poultry Pre-Harvest Peer Review Panel, USDA, Office of Scientific Quality Review (OSQR)
 2010-2011 Member, International Scientific Advisory Committee, International Congress of Mucosal Immunology
 2009 Member, NIH Special Emphasis Panel, Immune Defense Mechanisms at the Mucosa
 2009 Member, International Scientific Advisory Committee, International Congress of Mucosal Immunology
 2008-2009 Member, American Society of Microbiology, Culture Collections Colloquium Planning Committee
 2008-2010 Member, Bill and Melinda Gates Foundation, Grand Challenges Explorations Review Panel, Rounds 1-4
 2007 Member, Review Panel, University of Michigan Medical School's Endowment for the Basic Sciences (EBS)
 2006-2009 Member, Steering Committee, International Congress of Mucosal Immunology
 2006 Member, FDA Site Visit, Center for Biologics Evaluation and Research
 2006-2010 Member, Board of Governors, Arizona Arts, Science and Technology Academy
 2005-2008 Alternate, Committee on Election to Fellowship, American Academy of Microbiology
 2004 Member, NIH Vaccine Study Section
 2003 Chairman, NIH Bacterial BioDefense Study Section
 2003-2004 Member, Finance Committee, American Society for Microbiology
 2003 Ad hoc Member, NIH BM-2 Vaccine Study Section
 2002-2003 Member, Nominating Committee, American Society for Microbiology
 2002 Member, NIDCR Scientific Advisory Panel
 2001-Present Member, National Academy of Sciences
 2001-2004 Division Councilor at Large, Council Policy Committee and Council, American Society for Microbiology
 2001-2003 Member, NIH Vaccine Research Study Section
 2000-Present Member, Board of Executive Editors, Escherichia coli & Salmonella: Cellular and Molecular Biology, The Electronic Edition, ASM Press
 2000-2005 Editor-in-Chief and Chairman Board of Executive Editors, Escherichia coli & Salmonella: Cellular and Molecular Biology, The Electronic Edition, ASM Press
 1998-2003 Member, Advisory Committee-Bacteriology Program, American Type Culture Collection
 1996-2004 Heiser Trust, Scientific Advisory Board
 1999-2001 Division Z Councilor at Large, American Society for Microbiology Council
 1999 Chairman, NIH Panel on Leprosy Research in the Post-Genome Era
 1998-1999 Member, Compensation Committee, American Type Culture Collection
 1996-1999 Member, Molecular Biology Advisory Committee, American Type Culture Collection
 1995-1999 Member, Board of Trustees, American Type Culture Collection
 1995-1999 Member, Executive Committee of Board of Trustees, American Type Culture Collection
 1995-1997 Member, Development and Public Affairs Committee, American Type Culture Collection
 1995-1997 Member, Trustees Nominating Committee, American Type Culture Collection
 1993-1996 Editor, Escherichia coli & Salmonella: Cellular & Molecular Biology, 2nd ed., ASM Press
 1992-1995 Member, Executive Committee of Board of Directors, American Type Culture Collection
 1993-1995 Chairman, Science Committee, American Type Culture Collection
 1989-1995 Member, Board of Directors, American Type Culture Collection
 1993-1994 Member, American Society for Microbiology Nominating Committee

1991-1994 Division Councilor at Large, Council Policy Committee and Council, American Society for Microbiology
 1991 Member, Review Panel, Undergraduate Biological Sciences Education, Howard Hughes Medical Institute
 1989-1991 Division B Councilor, American Society for Microbiology Council
 1988 Organizer, Workshop on Computerization of Data Bases for Genetic Stock Collections
 1987-1999 Member, Editorial Board, ASM News
 1987 Member, NIH Research Centers for Oral Biology Review Committee
 1987 Ad hoc Member, National Institute of General Medical Sciences Council
 1986 Co-organizer, ASM Conference on Streptococcal Genetics
 1985-1992 Editor, Infection and Immunity
 1984-1989 Member, Cystic Fibrosis Foundation Research Development Program Review Committee
 1983-1986 Member, WHO Steering Committee on the Immunology of Tuberculosis
 1982 Visiting Professor, University of Oklahoma
 1980-1983 Member, NIH Genetic Basis of Disease Review Committee (Chairman 1981-1983)
 1978-1981 Vice President, Council for Advancement of Scientific Writing
 1977-1980 Branch Councilor at Large, Council Policy Committee and Council, American Society for Microbiology
 1977 Southeastern Branch Councilor, Council American Society for Microbiology Council
 1976-1981 Member, Board of Directors, Council for Advancement of Scientific Writing
 1976 Member, International Council of Scientific Unions Ad Hoc Committee on Recombinant DNA
 1975-1978 Member, NSF Genetic Biology Advisory Panel
 1974-1977 Member, NIH Recombinant DNA Molecule Advisory Committee
 1973 Visiting Professor, Universidad Catolica de Chile, Santiago, Chile
 1972 Visiting Professor, University of Puerto Rico, San Juan, PR
 1970-1976 Editor, Journal of Bacteriology
 1969 Visiting Professor, Instituto Venezolano de Investigaciones Cientificas, Caracas, Venezuela
 1966-1970 Editorial Board Member, Journal of Bacteriology

HONORS

2013 Rubbo Orator, Australian Society for Microbiology (ASM), Annual Scientific Meeting, Adelaide
 2013 Recipient of the Rubbo Medallion, Australian Society for Microbiology (ASM), Annual Scientific Meeting, Adelaide
 2013 Honoree, ASU Faculty Achievement Award, Defining Edge Research and Creative Work – Natural Sciences/Math
 2012 Recipient of the McLaughlin Medallion, Galveston National Laboratory, University of Texas Medical Branch
 2012 Faculty of 1000, Kong et al. 2012. PNAS USA, listed below in Publications
 2012 Invited Speaker, Innovet, International Conference for Veterinary and Food Industries, St. Hyacinthe, Canada
 2012 Austin and Joan Larsen Distinguished Visiting Lecturer, Washington State University, Pullman
 2012 Invited Speaker, Special Lecture, Summer School on Infection Research, Helmholtz Centre for Infection Research, Juliusruh, Rügen, Germany
 2012 Invited Speaker, George B. Saul Lectures, Middlebury College, Middlebury, VT
 2012 Invited Speaker, College of Veterinary Medicine, University of Minnesota, St. Paul
 2011 Invited Speaker, International Symposium: Major Emergent Animal Diseases, Public Health and Food Safety, Chengdu, PR China
 2011 Invited Speaker, International symposium: New Approaches to Animal Disease, Food Safety and Public Health for the 21st Century, Beijing, PR China
 2011 Maurice Ogur Memorial Lecture, University of Southern Illinois, Carbondale
 2010 Honorary Diplomat, American College of Veterinary Microbiologists
 2010 Honorary Professor, East China University of Science and Technology, Shanghai, P.R. China
 2010 Keynote Speaker, BIT Life Sciences' 2nd Annual World Vaccine Congress-2010, Beijing, P.R. China
 2010 Invited Speaker, UC Irvine Microbiology and Molecular Genetics Graduate Student Sponsored Seminar Series, Irvine, CA
 2010 Invited Speaker, South Texas Center for Emerging Infectious Diseases (STCEID) Seminar Series, San Antonio, TX
 2010 Distinguished Lecturer, Los Alamos National Laboratory Director's Colloquium Series, Los Alamos, NM
 2009 Cornell University, College of Agriculture and Life Sciences Outstanding Alumni Award, Ithaca, NY
 2009 Distinguished Lecturer, A Frank N. Nelson Lecture Series, Montana State University, Bozeman, MT
 2009 Faculty of 1000 Biology, Baek et al. 2009. J. Bacteriology, listed below in Publications

- 2008 Invited Speaker, Infection, Immunology and Vaccine Honored Speaker Program, Louisiana State University Health Sciences Center
- 2008 Invited Speaker, Wellcome Trust Advanced Course Molecular Basis of Bacterial Infection, Sanger Institute
- 2008 Faculty of 1000 Biology, Zhao et al. 2008. PNAS USA, listed below in Publications
- 2007 Ippen-Ihler Memorial Lecture, Texas A&M, Health Science Center
- 2007 Arizona Bioscience Researcher of the Year, Arizona BioIndustry Association
- 2007 Distinguished Lecturer, National Academy of Sciences Lectureship Series, University of Minnesota, Twin Cities
- 2007 Keynote Speaker, Synthetic Biology Engineering Research Center (SynBERC) Annual Retreat
- 2007 Keynote Speaker, Mid-Atlantic Microbial Pathogenesis Meeting
- 2006 Distinguished Lecturer, Centers for Disease Control and Prevention
- 2006 Invited Speaker, Arizona State University Chapter of Sigma Xi Annual Banquet
- 2006 Keynote Speaker, 2nd ASM Conference on *Salmonella*: From Pathogenesis to Therapeutics
- 2005 Recipient of Grant Award from the Bill and Melinda Gates Foundation for the Grand Challenges in Global Health Initiative
- 2005 Keynote Speaker, Annual Meeting Arizona-Nevada Branch of ASM
- 2005 Fellow, Arizona Arts, Science and Technology Academy
- 2005-Present George William and Irene Koechig Freiberg Professor of Biology Emeritus, Washington University
- 2003 Ellison Medical Foundation Global Infectious Disease Senior Scholar
- 2003 Sardinia Science Award, University of Sassari, Alghero, Italy
- 2003 Honorary Doctor of Science, Southern Illinois University, Edwardsville
- 2002 David J. Hentges Lecture on Infectious Disease, Texas Tech
- 2002 Robert P. Williams Memorial Lecturer, Baylor College of Medicine
- 2001 Faculty of 1000 Biology, Daigle et al. 2001. PNAS USA, listed below in Publications
- 2001 Member, National Academy of Sciences
- 2001 Fellow, The Academy of Science of St. Louis
- 2001 Graduate Research Day Colloquium Lecture, Uniformed Services University of the Health Sciences
- 2001 Chancellor's Distinguished Lecturer, Louisiana State University
- 2000 Animal Health Microbiology Division Lecturer, American Society for Microbiology General Meeting
- 2000 Education Division Lecturer, American Society for Microbiology General Meeting
- 1999 Keynote Speaker, 4th International Symposium on Typhoid Fever and Other Salmonellosis
- 1997 Missouri Inventor of the Year, Bar Association of Metropolitan St. Louis
- 1996 Elaine and Arthur Brown Distinguished Lecturer, University of Tennessee-Knoxville
- 1994 Chairman, Gordon Research Conference on Microbial Toxins and Pathogenesis
- 1994 A. L. Bortree Lecturer, Pennsylvania State University
- 1993 Co-Chairman, Gordon Research Conference on Molecular Mechanisms of Microbial Adhesion
- 1993 Edwin H. Beachey Memorial Lecturer, Univ. Tenn.-Memphis
- 1992 Vice Chairman, Gordon Research Conference on Microbial Toxins and Pathogenesis
- 1991 Recipient of \$500,000 Grant Award from Bristol-Myers Squibb to support infectious diseases research
- 1990 Fellow, American Association for the Advancement of Science
- 1990 Smiley Lecture, Department of Microbiology, University of Kansas
- 1990 Distinguished Lecturer in Molecular Biology, Louisiana State University Medical Center
- 1990 Stuart Mudd Memorial Lecture, Eastern Pennsylvania Branch of the American Society for Microbiology
- 1988 MERIT Award, National Institute of Dental Research
- 1988 Herman C. Lichstein Distinguished Lecturer, University of Cincinnati
- 1986 Keynote Lecturer, Fiftieth Anniversary of Graduate Dental Education at The University of Rochester
- 1984 Seymour J. Kreshover Award, National Institute of Dental Research
- 1984-2005 George William and Irene Koechig Freiberg Professor of Biology, Washington University
- 1983 Scholar-Leadership Enrichment Program Scholar, University of Oklahoma
- 1982 M. F. Shaffer Alumni Lecturer, Tulane University
- 1978-1983 Charles H. McCauley Professor of Microbiology, University of Alabama at Birmingham
- 1975 Recipient, P. R. Edwards Award of the Southeastern Branch of the American Society for Microbiology
- 1974 Fellow, American Academy of Microbiology
- 1973 Honorary Member, Asociacion Chilena de Microbiologia
- 1969-1970;
1979-1980;
1981-1982 Lecturer, American Foundation for Microbiology

1962	Sigma Xi
1960-1962	US Public Health Service Predoctoral Fellow, University of Chicago
1958-1960	University Fellow, University of Chicago
1955	Danforth Fellowship, Cornell University
1955	Quill and Dagger, Cornell University
1955	Ho-Nun-De-Kah, Cornell University
1953	Alpha Zeta, Cornell University
1952-1956	New York State Regents Scholarship, Cornell University
1952-1956	Esso 4-H Scholarship, Cornell University

BIOGRAPHICAL RESUMES

American Men and Women of Science
 Who's Who in the World
 Who's Who in America
 Who's Who in Medicine and Health Care
 Who's Who in Frontier Science and Technology
 Who's Who in American Education
 Who's Who in the Midwest

PROFESSIONAL SOCIETY MEMBERSHIPS

2012-Present The American Association of Immunologist
 2005-Present Arizona Arts, Science and Technology Academy
 Member, Board of Governors 2006-
 2001-Present The National Academy of Sciences
 1998-Present The Academy of Science of St. Louis, Fellow 2001
 1997-Present International Society for Vaccines
 1990-Present American Association of Avian Pathologists
 1988-Present Conference of Research Workers on Animal Diseases
 1988-Present International Society of Mucosal Immunology
 Member, Congress of Mucosal Immunology Steering Committee 2006-2007
 1970-Present American Association for the Advancement of Science
 Fellow 1990
 1960-Present Society for General Microbiology
 1960-Present American Society for Microbiology
 Member, American Society of Microbiology, Culture Collections Colloquium Planning Committee
 Committee on Elections, American Academy of Microbiology, Alternate 2005-2008
 Finance Committee, 2003-2004
 Editor-in-Chief and Chairman, Board of Executive Editors, *Escherichia coli* and *Salmonella: Cellular and Molecular Biology*, 2000-2005
 Member, Board of Executive Editors, *Escherichia coli* and *Salmonella: Cellular and Molecular Biology* 2000-Present
 Counselor, Division of Animal Health Microbiology, 1999-2001
 Organizing Committee for Division of Animal Health Microbiology, 1998-1999
 Finance Committee, 1992-1994
 Committee on Governance, 1991-1994
 Division Councilor At Large to the Council Policy Committee and Council, 1991-1994; 2001-2004
 Steering Committee for Undergraduate Faculty-Mentor Enhancement Program, 1989-1992
 Representative to the American Type Culture Collection Board of Directors, 1989-1995
 Committee on Genetics and Molecular Biology, PSAB, 1988-1993
 Counselor, Division of Microbial Pathogenesis, 1989-1991
 Alternate Counselor, Division of Microbial Pathogenesis, 1987-1989
 Member, Editorial Board, *ASM News*, 1987-1999
 Editor, *Infection and Immunity*, 1985-1992
 Select Committee to Review Governance of ASM, 1981-1983
 Headquarters Building Subcommittee, 1979-1980
 Constitution and By Laws Committee, 1979
 Investment Subcommittee, 1978-1981
 Nominating Committee, 1978; 1993-1994: 2002-2003

Ad Hoc Committee on Public and Scientific Affairs, 1978-1979
 Committee on Committees, 1977
 Branch Counselor At Large to the Council Policy Committee and Council, 1977-1980
 Counselor, Southeastern Branch, 1977
 Latin American Visiting Professor Program Committee, 1973-1978
 Chairman, Division of Genetics and Molecular Biology Nominating Committee, 1973
 Membership Committee, 1971-1976
 Editor, Journal of Bacteriology, 1970-1976
 Parliamentarian, 1970-1975
 President, Kentucky and Tennessee Branch, 1968-1969
 Vice President, Kentucky and Tennessee Branch, 1967-1968
 Editorial Board Member, Journal of Bacteriology, 1966-1970
 1970-1991 New York Academy of Sciences
 1960-1991 Genetics Society of America
 Nominating Committee, 1983
 Committee on Preservation of Germplasm, 1983-1989; Chairman, 1987-1989

TEACHING:

Arizona State University, Tempe, AZ

BCH 392 Biochemistry Independent Research 2008
 BIO 189 Career Paths In Life 2006-2010; 2012 (guest lecturer)
 BIO 194 Freshman Microbiology Seminar 2006 (guest lecturer)
 BIO 311 Biology and Society 2006-2008 (guest lecturer)
 BIO 312 Bioethics 2012, 2013 (guest lecturer)
 BIO 343 Genetic Engineering and Society 2006-2008 (guest lecturer)
 BIO 416 Professional Values in Science 2006-2010 (guest lecturer)
 BIO 484 Internship 2009, 2010
 BIO 495 Undergraduate Research 2011-2013
 MIC 191 Freshman Microbiology Seminar 2006; 2007 (two sessions), 2008-2010
 MIC 394 Milestones in Microbial Genetics and Phage Biology 2007-2010
 MIC 401 Undergraduate Research Paper 2007, 2012, 2013
 MIC 420 Immunology: Molecular and Cellular Foundations 2013 (guest lecturer)
 MIC 492 Honors Directed Study 2011-2012
 MIC 493 Honors Thesis 2010
 MIC 495 Undergraduate Research 2006-2012
 MIC 499 Individualized Instruction 2010-2012
 MIC 598 Integrative Microbiology 2009 (guest lecturer)
 MBB 493 Honors Thesis 2008, 2009, 2010
 MBB 484 Internship 2009, 2010
 MBB 499 Internship 2009, 2011
 Weekly Journal Club, 2005-present
 Triweekly 2-hour Research Review Sessions, 2005-present

Washington University, St. Louis, MO

BIO 3920 Global Impact of Biotechnology 2002-2004
 BIO 5011 Ethics and Research Science 2001
 BIO 349 Microbiology 1995, 1996, 1997
 BIO 349 Microbiology Laboratory 1996, 1997
 BIO 445 Microbial Genetics 1984-1987
 BIO 181 Freshman Biology Seminar 1983, 1985-1987, 1989-1993
 BIO 500 Undergraduate Independent Research 1983-2005

University of Alabama at Birmingham

Molecular Cell Biology 1974-1978, 1979-1983
 Medical Microbiology 1973-1978, 1979-1982
 Dental Microbiology 1973-1978, 1979-1982
 Microbial Genetics 1973

Graduate Seminar 1972, 1974, 1978

University of Tennessee Graduate School of Biomedical Sciences
Advanced Genetics 1967-1972

University of Tennessee at Knoxville
Virology 1965

CURRENT MAIN AREA OF RESEARCH

Design, construction and evaluation of vaccines to elicit protective host immune responses in agriculturally important animals and humans, mechanisms of bacterial pathogenesis and host immune responses to infections and vaccines. Genetic engineering of cyanobacteria for biofuels production.

PUBLICATIONS

1. Baker, R. C., and R. Curtiss III. 1957. Individual hen differences in eggshell mottling and the relationship of shell mottling to clutch size, internal quality and weight loss. *Poultry Sci.* **36**:904-908
2. Levine, M., and R. Curtiss III. 1958. A genetic test for side-chains in a phage chromosome. *Nature* **182**:126-127.
3. Baker, R. C., and R. Curtiss III. 1958. Strain difference in eggshell mottling, internal quality, shell thickness, specific gravity, and the interrelationships between these factors. *Poultry Sci.* **37**:1086-1090.
4. Levine, M., and R. Curtiss III. 1960. An effect of chloramphenicol on genetic recombination and selection in phage. *Virology* **10**:370-371.
5. Levine, M., and R. Curtiss III. 1961. Genetic fine structure of the *c* region and the linkage map of phage P22. *Genetics* **46**:1573-1580.
6. Curtiss, R. III. 1964. A stable partial diploid strain of *Escherichia coli*. *Genetics* **50**:679-694.
7. Curtiss, R. III. 1965. Chromosomal aberrations associated with mutations to bacteriophage resistance in *Escherichia coli*. *J. Bacteriol.* **89**:28-40.
8. Curtiss, R. III, L. J. Charamella, C. M. Berg, and P. E. Harris. 1965. Kinetic and genetic analyses of D-cycloserine inhibition and resistance in *Escherichia coli*. *J. Bacteriol.* **90**:1238-1250.
9. Berg, C. M. and R. Curtiss III. 1967. Transposition derivatives of an Hfr strain of *Escherichia coli* K-12. *Genetics* **56**:503-525.
10. Curtiss, R. III, and D. R. Stallions. 1967. Energy requirement for specific pair formation during conjugation in *Escherichia coli* K-12. *J. Bacteriol.* **94**:490-492.
11. Curtiss, R. III. 1968. Ultraviolet-induced genetic recombination in a partially diploid strain of *Escherichia coli*. *Genetics* **58**:9-54.
12. Cohen, A., W. D. Fisher, R. Curtiss III, and H. I. Adler. 1968. DNA isolated from *Escherichia coli* minicells mated with F⁺ cells. *Proc. Natl. Acad. Sci. USA* **61**:61-68.
13. Curtiss, R. III, L. J. Charamella, D. R. Stallions, and J. A. Mays. 1968. Parental functions during conjugation in *Escherichia coli* K-12. *Bacteriol. Rev.* **32**:320-348.
14. Cohen, A., W. D. Fisher, R. Curtiss III, and H. I. Adler. 1968. The properties of DNA transferred to minicells during conjugation. *Cold Spring Harbor Symp. Quant. Biol.* **33**:635-641.

15. Curtiss, R. III, and J. Renshaw. 1969. F⁺ strains of *Escherichia coli* K-12 defective in Hfr formation. *Genetics* **63**:7-26.
16. Curtiss, R. III, and D. R. Stallions. 1969. Probability of F integration and frequency of stable Hfr donors in F⁺ populations of *Escherichia coli* K-12. *Genetics* **63**:27-38.
17. Curtiss, R. III, and J. Renshaw. 1969. Kinetics of F transfer and recombinant production in F⁺ X F⁻ matings in *Escherichia coli* K-12. *Genetics* **63**:39-52.
18. Curtiss, R. III. 1969. Bacterial conjugation. *Annu. Rev. Microbiol.* **23**:69-136.
19. Curtiss, R. III, L. G. Caro, D. P. Allison, and D. R. Stallions. 1969. Early stages of conjugation in *Escherichia coli* K-12. *J. Bacteriol.* **100**:1091-1104.
20. Jones, R. T., and R. Curtiss III. 1970. Genetic exchange between *Escherichia coli* strains in the mouse intestine. *J. Bacteriol.* **103**:71-80.
21. Roozen, K. J., R. G. Fenwick, Jr., and R. Curtiss III. 1971. Isolation of plasmids and specific chromosomal segments from *Escherichia coli* K-12, p. 249-264. *In* L. Ledoux (ed.), *Informative Molecules in Biological Systems*. North Holland, Amsterdam.
22. Stallions, D. R., and R. Curtiss III. 1971. Chromosome transfer and recombinant formation with deoxyribonucleic acid temperature-sensitive strains of *Escherichia coli*. *J. Bacteriol.* **105**:886-895.
23. Roozen, K. J., R. G. Fenwick, Jr., and R. Curtiss III. 1971. Synthesis of ribonucleic acid and protein in plasmid-containing minicells of *Escherichia coli* K-12. *J. Bacteriol.* **107**:21-33.
24. Stallions, D. R., and R. Curtiss III. 1972. Bacterial conjugation under anaerobic conditions. *J. Bacteriol.* **111**:294-295.
25. Sheehy, R. J., C. Orr, and R. Curtiss III. 1972. Molecular studies on entry exclusion in *Escherichia coli* minicells. *J. Bacteriol.* **112**:861-869.
26. Sheehy, R. J., D. P. Allison, and R. Curtiss III. 1973. Cryptic plasmids in a minicell-producing strain of *Salmonella typhimurium*. *J. Bacteriol.* **114**:439-442.
27. Frazer, A. C., and R. Curtiss III. 1973. Derepression of anthranilate synthase in purified minicells of *Escherichia coli* containing the Col-trp plasmid. *J. Bacteriol.* **114**:615-622.
28. Sheehy, R. J., A. Perry, D. P. Allison, and R. Curtiss III. 1973. Molecular nature of R-factor deoxyribonucleic acid isolated from *Salmonella typhimurium* minicells. *J. Bacteriol.* **114**:1328-1335.
29. Fenwick, R. G., Jr., and R. Curtiss III. 1973. Conjugal DNA replication by *Escherichia coli* K-12: stimulation in *dnaB*(TS) donors by minicells. *J. Bacteriol.* **116**:1212-1223.
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- Pei, Y., V. R. Parreira, K. L. Roland, R. Curtiss III, and J. F. Prescott. 2013. Assessment of attenuated *Salmonella* vaccine strains in controlling experimental *Salmonella* Typhimurium infection in broiler chickens. *Can. Vet. J. Res.* In Press
- Sun, W., J. Olinzock, S. Wang, S. Sanapala, and R. Curtiss III. 2013. Evaluation of YadC protein delivered by live attenuated *Salmonella* as a vaccine against plague. *Pathog. Dis.* In Press
- Guan, L., J. Santander, M. Mellata, Y. Zhang, and R. Curtiss III. 2013. Identification of an iron acquisition machinery of *Flavobacterium columnare*. *Dis. Aquat. Organ.* In Press
- Frey, S., K. R. Lottenbach, H. Hill, T. P. Blevins, Y. Yu, Y. Zhang, K. E. Brenneman, S. M. Kelly-Aehle, C. McDonald, A. Jansen, and R. Curtiss III. 2013. A Phase I, dose-escalation trial in adults of three recombinant attenuated *Salmonella* Typhi vaccine vectors producing *Streptococcus pneumoniae* surface protein antigen PspA. *Vaccine.* In Press

PATENTS

1. Curtiss, R. III. Modified Microorganisms and Method of Preparing and Using Same. Filed Sep. 30, 1976. (Patent on biological containment and EK2 host-vector systems.)

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
Germany	Issued	2,644,432	12/29/88			
United Kingdom	Issued	1,146,458	9/30/78			
United States	Issued	4,190,495	2/26/80			
United States	Issued	4,968,619	11/27/90			

2. Curtiss, R. III. Vaccines Obtained From Antigenic Gene Products of Recombinant Genes. Filed Oct. 22, 1981. (Patent on use of recombinant avirulent *Salmonella*, *Escherichia* and *Salmonella-Escherichia* hybrids as antigen delivery vectors to induce mucosal, systemic and cellular immunity.)

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
Greece	Issued	76,769	9/03/84		10/22/97	
Canada	Issued	1,338,705	11/12/96		11/12/13	
Germany	Issued	P3279824.5	7/19/89		10/22/02	
Ireland	Issued	55478	1/09/91		10/21/98	
Japan, 10/22/82	Pending			57-185912		
Japan, 5/25/93	Pending			5-144230		
EPO, 7/19/89, entitled "Live Vaccine and Its Method of Production"						
Austria	Issued	080,806	7/19/89		10/22/02	
Belgium	Issued	080,806	7/19/89		10/22/02	
France	Issued	080,806	7/19/89		10/22/02	
United Kingdom	Issued	080,806	7/19/89		10/22/02	
Italy	Issued	080,806	7/19/89		10/22/02	
Luxembourg	Issued	080,806	7/19/89		10/22/02	
Netherlands	Issued	080,806	7/19/89		10/22/02	
Sweden	Issued	080,806	7/19/89		10/22/02	
Switzerland	Issued	080,806	7/19/89		10/22/02	

CIP filed Sep. 9, 1985, refiled Nov. 13, 1989 and Dec. 6, 1991

United States	Issued	4,888,170	12/19/89		12/19/06	
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Continuation Filed 5/2/94

Curtiss, R. III. Recombinant Avirulent Bacterial Antigen Delivery System.

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
United States	Issued	5,888,799	3/30/99		3/30/16	

3. Curtiss, R. III. Avirulent Microbes and Uses Therefor. Filed Jun. 4, 1987; First CIP filed Jun. 1, 1988. (Patent on Δcya and Δcrp attenuation mutations.)

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
Australia	Issued	623599	9/22/92		6/01/04	
Canada	Issued	1,338,957			3/04/14	
China	Issued	88104317.6			6/04/03	
Denmark	Pending					937950
Ireland	Issued	63905	5/31/95		1/06/08	
Israel	Issued	86583			5/31/08	
Japan	Issued	2640525	5/02/97		6/01/08	
New Zealand	Issued	224884			6/02/04	
Rep. of South Korea	Issued	139950	3/07/98		3/07/13	
Singapore	Pending					
South Africa	Issued	88/3954	2/22/89		6/03/08	
United States	Issued	5,389,368	2/14/95		2/07/12	
EPO 0315682B1, 6/1/08						
Austria	Issued	E98870	12/22/93		6/01/08	
Belgium	Issued	BE0315682	12/22/93		6/01/08	
France	Issued	FR0315682	12/22/93		6/01/08	
Germany	Issued	DE3886506 T2	12/22/93		6/01/08	
United Kingdom	Issued	GB0315682	12/22/93		6/01/08	
Italy	Issued	IT0315682	12/22/93		6/01/08	
Luxembourg	Issued	2U0315682	12/22/93		6/01/08	
Netherlands	Issued	NL0315682	12/22/93		6/01/08	
Sweden	Issued	88905542.2	12/22/93		6/01/08	
Switzerland	Issued	CH0315682	12/22/93		6/01/08	

4. Curtiss, R. III. Avirulent Microbes and Uses Therefor: *Salmonella choleraesuis*. Second CIP filed Mar. 31, 1989. (Patent on Δcya and Δcrp attenuation mutations in *S. choleraesuis*.)

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
Canada	Pending					937960
Japan	Pending					937965
United States	Issued	5,468,485	11/21/95		11/21/12	

5. Curtiss, R. III, and S. M. Kelly. Avirulent Microbes and Uses Therefor: *cdt*. Third CIP filed Nov. 7, 1990. (Patent on Δcdt attenuation mutation alone and in combination with *cya* and *crp* mutations.) Divisional patent EP0556333

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
EPO						
		92901722.6-210	3/19/03			3116-8419
Austria	Issued	03006123.8	9/05/03			
Belgium	Issued	03006123.8	9/05/03			
Denmark	Issued	03006123.8	9/05/03			
France	Issued	03006123.8	9/05/03			
Germany	Issued	03006123.8	9/05/03			
United Kingdom	Issued	03006123.8	9/05/03			
Italy	Issued	03006123.8	9/05/03			
Luxembourg	Issued	03006123.8	9/05/03			
Liechtenstein	Issued	03006123.8	9/05/03			
Netherlands	Issued	03006123.8	9/05/03			
Spain	Issued	03006123.8	9/05/03			

Sweden	Issued	03006123.8	9/05/03		
Switzerland	Issued	03006123.8	9/05/03		
Australia	Issued	666108	5/20/96	11/08/11	
Canada, 11/8/91	Issued	2,095,534	9/17/02	11/08/11	53116-8421
Ireland	Pending				937955
Israel	Issued	100010	5/18/98	11/08/11	
Japan	Issued	502265/1992	10/1/04	11/08/11	MEG-200.49JP
New Zealand	Issued	240538	6/14/94	11/11/07	
South Africa	Issued	91/8876	11/08/91	11/08/11	
United States	Issued	5,387,744	2/07/95	2/07/12	

6. Curtiss, R. III. Avirulent Microbes and Uses Therefor: *Salmonella typhi*. Fourth CIP filed Nov. 7, 1991. (Patent on Δcya and Δcrp attenuation mutations in *S. typhi*.)

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
United States	Issued	5,294,441	3/15/94		3/15/11	

7. Curtiss, R. III. Avirulent Microbes and Uses Therefor: *crp*. Continuation and divisional filed Jul. 7, 1993. (Patent on Δcrp attenuation mutation.)

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
United States	Issued	5,855,879	1/5/99		1/05/16	

8. Curtiss, R. III. Avirulent Microbes and Uses Therefor: *cya*. Divisional filed Feb. 6, 1996. filed 1/4/99. (Patent on Δcya attenuation mutation.)

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
United States	Issued	5,855,880	1/5/99		10/07/07	

9. Curtiss, R. III. A Method of Maintaining a Desired Recombinant Gene in a Genetic Population of Cells. Filed Oct. 7, 1987; CIP Filed Oct. 3, 1988. Continuation filed 3/10/95, 6/7/95, and 11/20/98. (Patent on balanced-lethal host-vector systems for stable high-level expression of foreign antigens.)

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
Australia	Issued	637969	10/6/88		10/06/04	
Canada	Issued	1,339,412	9/2/97		9/02/14	
Japan, 10/6/88	Pending			1-500124		3116-7932
Japan (Divisional filed)	Pending	10-358165				3116-6480
United States	Issued	5,672,345	9/30/97	10/35865	9/30/14	
United States	Pending	09/196,057				3116-7655
EPO	Issued	0381706 B1			10/06/08	
Austria	Issued	E 121785	4/26/95		10/06/08	
Belgium	Issued	0381706	4/26/95		10/06/08	
France	Issued	0381706	4/26/95		10/06/08	
Germany	Issued	DE 3853683.8	4/26/95		10/06/08	
Italy	Issued	0381706	4/26/95		10/06/08	
Luxembourg	Abandoned	0381706	4/26/95		10/06/08	
Netherlands	Issued	0381706	4/26/95		10/06/08	
Sweden	Issued	0381706	4/26/95		10/06/08	
Switzerland	Issued	0381706	4/26/95		10/06/08	
United Kingdom	Issued	0381706	4/26/95		10/06/08	
United States	Issued	5,840,483	11/24/98		11/24/15	

(patent on vector claims)

10. Curtiss, R. III, and G. A. Cardineau. Oral Immunization by Transgenic Plants. Filed Sep. 6, 1988; CIP filed Aug. 29, 1989; continuation and two divisionals filed Jun. 1, 1995. (Patent on immunization by oral feeding of transgenic plants expressing colonization and virulence antigens of microbial pathogens.)

PCT, 9/5/89, PCT/US89/03799, 3/22/90 WO 90/02484. Filed nationally in Australia, Denmark, EPO, Japan, and Korea.

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
Australia	Issued	634178	6/25/93	43172/89		MPS (2570)
Brazil, 5/14/97	Pending			PI 1101003-7		MPS (2570)
Canada	Issued	1,339,307	8/19/97	610,249		MPS SG-59
Hong Kong, 12/22/98, Pending				98114604.2		
Japan, 9/5/89	Pending	4-501801	(Pub. 4/2/92)	1-509842		MPS SG-59
Japan, 9/5/89	Pending	11-200841				
Mexico, 9/6/89	Pending	17593				
New Zealand	Issued	230,576	9/22/92			
United States, 8/29/89	Pending Appeal	#93-4341		07/398,520		MPS SG-59 C1
United States	Issued	5,686,079	11/11/97		11/11/14	
United States	Issued	5,679,880	10/21/97		10/21/14	
United States	Issued	5,654,184	8/5/97		8/5/14	
EPO, 9/5/89, filed		0433372	6/12/03	89910552.2	09/15/09	MPS SG-59
Austria	Issued	AT218797				
Belgium	Issued	BE433372				
France	Issued	FR433372				
Germany	Issued	6892405.0				
United Kingdom	Issued	GB433372				
Greece	Pending					
Italy	Issued	IT433372				
Luxembourg	Issued	LU433372				
Netherlands	Issued	NL433372				
Spain	Pending					
Sweden	Issued	SE433372				
Switzerland (Liechtenstein)	Issued	P433372				

PCT, 9/5/89, WO 90/02484, 3/22/90 US89/03799

11. Curtiss, R. III, and J.E. Galan. Vaccines Containing Avirulent *phoP* Microorganisms. Filed Mar. 31, 1989. (Patent on *phoP* mutation rendering bacteria avirulent and immunogenic.) European Patent Filed Mar. 23, 1990. PCT filed Mar. 23, 1990.

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
Australia	Issued	645,489	5/6/94		3/23/06	
Canada	Issued	0500699	6/10/98		3/20/10	
Finland	Pending					
Hungary	Pending					
Japan	Issued	3004049	11/19/99		3/23/10	
Norway	Pending					
United States	Issued	5,424,065	6/13/95	981,935	6/13/12	
PCT		WO 90/11687		PCT/US90/01573		
EPO	Issued	0465560	6/5/96		3/23/10	
(opposition filed and rejected)						
Austria	Issued	AT E 138784	6/5/96		3/23/10	
Belgium	Issued	0465560	6/5/96		3/23/10	
Denmark	Issued	0465560	6/5/96		3/23/10	
France	Issued	0465560	6/5/96		3/23/10	
Germany	Issued	DE69027313 T2	6/5/96		3/23/10	

United Kingdom	Issued	0465560	6/5/96	3/23/10
Italy	Issued	0465560	6/5/96	3/23/10
Luxembourg	Issued	0465560	6/5/96	3/23/10
Netherlands	Issued	0465560	6/5/96	3/23/10
Spain	Issued	0465560	6/5/96	3/23/10
Sweden	Issued	0465560	6/5/96	3/23/10
Switzerland	Issued	0465560	6/5/96	3/23/10

12. Curtiss, R. III. Cross Protective *Salmonella* Vaccines. Filed Nov. 3, 1989. (Patent on using *pmi*, *galE* and *fur* mutations in conjunction with other attenuating mutations to enhance induction of cross protective immunity.)

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
Europe	Issued	0500699	6/10/98		11/20/10	
Austria	Issued	0500699	6/10/98		11/20/10	
Belgium	Issued	0500699	6/10/98		11/20/10	
Denmark	Issued	0500699	6/10/98		11/20/10	
France	Issued	0500699	6/10/98		11/20/10	
Germany	Issued	DE69032408T2	6/10/98		11/20/10	
Greece	Issued	0500699	6/10/98		11/20/10	
Italy	Issued	0500699	6/10/98		11/20/10	
Luxembourg	Issued	0500699	6/10/98		11/20/10	
Netherlands	Issued	0500699	6/10/98		11/20/10	
Spain	Issued	0500699	6/10/98		11/20/10	
Sweden	Issued	0500699	6/10/98		11/20/10	
Switzerland	Issued	0500699	6/10/98		11/20/10	
United Kingdom	Issued	0500699	6/10/98		11/20/10	

13. Curtiss, R. III. Recombinant Avirulent *Salmonella* Antifertility Vaccines. Filed Nov. 21, 1990; CIP filed Nov. 20, 1991 with R. Curtiss III and K. S. K. Tung as inventors. (Patent on using recombinant avirulent *Salmonella* expressing gamete-specific antigens to induce immunity to prevent fertilization.)

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
Canada	Pending			2,096,529		938461
Israel	Pending	100121				937967;3116-7967
South Africa	Issued	91/9213	11/21/91			
United States	Issued	5,656,488	8/12/97		8/12/14	
United States, 6/7/95;Pending				08/478,504		952997
Europe	Issued	0558631	3/17/99	92901072.6	11/20/11	
Belgium	Issued	0558631	3/17/99	92901072.6	11/20/11	
France	Issued	0558631	3/17/99	92901072.6	11/20/11	
Germany	Issued	69131014.9-08	3/17/99	92901072.6	11/20/11	
United Kingdom	Issued	0558631	3/17/99	92901072.6	11/20/11	
Netherlands	Issued	0558631	3/17/99	92901072.6	11/20/11	
Spain	Issued	0558631	3/17/99	92901072.6	11/20/11	
Switzerland	Issued	0558631	3/17/99	92901072.6	11/20/11	

14. Curtiss, R. III, and S. A. Tinge. Recombinant Bacterial Vaccine System with Environmentally Limited Viability. Filed Jun. 7, 1995. PCT filed Jun. 7, 1996. (Patent on methods to cause viability of live bacterial vaccines to be restricted to specific environments or to temperatures of immunized warm-blooded vertebrate hosts with death of such vaccines resulting from exposure to defined environments or to temperatures for growth below body temperatures.)

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
United States	Abandoned			08/473,789		3116-1780
United States	Issued	6,610,529	8/26/03	08/761,769		3116-1772

United States	Issued	7,871,604	1/18/11	09/120/970	8/22/19	
PCT		WO 96/40947		PCT/US96/09774		
Australia	Issued	711618	2/3/00	61664/96	6/7/16	
Canada	Pending			2,222,761		3116-1760
Japan	Issued	11-507532	7/6/99	S/N 9-501998		
Europe	Issued	0832255	12/14/05	96919292.1		3116-1761
Austria	Issued	0832255	12/14/05	96919292.1		
Belgium	Issued	0832255	12/14/05	96919292.1		
Switzerland	Issued	0832255	12/14/05	96919292.1		
Germany	Issued	0832255	12/14/05	96919292.1		
Denmark	Issued	0832255	12/14/05	96919292.1		
Spain	Issued	0832255	12/14/05	96919292.1		
Finland	Issued	0832255	12/14/05	96919292.1		
France	Issued	0832255	12/14/05	96919292.1		
United Kingdom	Issued	0832255	12/14/05	96919292.1		
Ireland	Issued	0832255	12/14/05	96919292.1		
Italy	Issued	0832255	12/14/05	96919292.1		
Liechtenstein	Issued	0832255	12/14/05	96919292.1		
Luxembourg	Issued	0832255	12/14/05	96919292.1		
Monaco	Issued	0832255	12/14/05	96919292.1		
Netherlands	Issued	0832255	12/14/05	96919292.1		
Portugal	Issued	0832255	12/14/05	96919292.1		
Sweden	Issued	0832255	12/14/05	96919292.1		

15. Curtiss, R. III, and C. A. Nickerson. Recombinant Vaccines Comprising Avirulent Immunogenic *S. typhi* Having RpoS Positive Phenotype. Filed November 14, 1997. PCT filed Nov. 13, 1998. (Patent on novel avirulent *Salmonella enterica* serotype Typhi having an RpoS⁺ phenotype for use as vaccines and delivery vehicles for gene products and to methods for their preparation.)

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
United States	Issued	6,024,961	2/15/00	08/970,789	11/14/17	3116-6059
PCT		WO99/25387		PCT/US98/24295		3116-7471
Israel, 5/14/00				136131		3116-4688
Japan						3116-4689
S. Korea, 5/15/00		7005297/2000				3116-4690

CIP filed 5/18/99

Recombinant Vaccines Comprising Immunogenic Attenuated Bacteria Having RpoS Positive Phenotype. Continuation filed 5/3/02

United States	Issued	6,383,496	5/7/02	09/314,062		3116-9419
Continuation		7,083,794	8/1/06	10/138,329		3116-33076
Australia	Issued	736242	11/8/01	14595/99		3116-4685
Canada	Issued	2,309,925	6/1/10	2,309,925	11/13/18	56029-4686
Europe	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687
Austria	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687
Belgium	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687
Switzerland	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687
Cyprus	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687
Germany	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687
Denmark	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687
Spain	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687
Finland	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687
France	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687
United Kingdom	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687
Greece	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687
Ireland	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687
Italy	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687

Liechtenstein	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687
Luxembourg	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687
Monaco	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687
Netherlands	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687
Portugal	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687
Sweden	Issued	1030690	7/3/02	98958581.5	11/13/18	3116-4687

16. Curtiss, R. III, and Steven Tinge. Regulated Antigen Delivery System. Filed April 28, 2000. PCT filed April 30, 2001.

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
United States	Issued	6,780,405	8/24/04	09/560,539		
United States	Issued	7,341,860	3/11/08	10/924,574		3116-4355
PCT		WO 01/083785		PCT/US01/13915		3116-7781
Regulated Antigen Delivery System (RADS) Involving Bacteria						
Europe	Issued	1292687	8/16/06	01944119.5		
Austria	Issued	1292687	8/16/06	01944119.5		
Belgium	Issued	1292687	8/16/06	01944119.5		
Switzerland	Issued	1292687	8/16/06	01944119.5		
Cyprus	Issued	1292687	8/16/06	01944119.5		
Germany	Issued	1292687	8/16/06	01944119.5		
Denmark	Issued	1292687	8/16/06	01944119.5		
Spain	Issued	1292687	8/16/06	01944119.5		
Finland	Issued	1292687	8/16/06	01944119.5		
France	Issued	1292687	8/16/06	01944119.5		
United Kingdom	Issued	1292687	8/16/06	01944119.5		
Greece	Issued	1292687	8/16/06	01944119.5		
Ireland	Issued	1292687	8/16/06	01944119.5		
Italy	Issued	1292687	8/16/06	01944119.5		
Liechtenstein	Issued	1292687	8/16/06	01944119.5		
Luxembourg	Issued	1292687	8/16/06	01944119.5		
Monaco	Issued	1292687	8/16/06	01944119.5		
Netherlands	Issued	1292687	8/16/06	01944119.5		
Portugal	Issued	1292687	8/16/06	01944119.5		
Sweden	Issued	1292687	8/16/06	01944119.5		
Turkey	Issued	1292687	8/16/06	01944119.5		
New Zealand	Issued	522433	8/12/04		4/30/21	MEG-213.0P

17. Curtiss, R. III. Functional Balanced-Lethal Host-Vector Systems. Filed October 11, 2000. PCT filed October 5, 2001.

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
United States	Issued	6,872,547	3/29/05	09/686,499		56029-1192
PCT				PCT/US01/42527		
Guatemala		Pending				3116-8517
Thailand		Pending				3116-8521

18. Curtiss, R. III, and Steven Tinge. Microbes Having an Attenuating Mutation Comprising a Transcription Terminator. Filed Oct. 12, 2000. PCT filed Nov. 10, 2001.

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
United States	Abandoned			09/689,123		15060-00005
PCT		WO 02/30457		PCT/US01/31606		15060-7
Canada				2,463,482		15060-32
Argentina				010104792		15060-8
Chilean				2442-01		15060-9
Europe	Issued	1326960	7/16/03	01979646.5		15060-33
France	Issued	1326960	7/16/03	01979646.5		15060-33
Great Britain	Issued	1326960	7/16/03	01979646.5		15060-33
Germany	Issued	60107707.5	8/12/05	01979646.5		

19. Curtiss, R. III, and H. Y. Kang. Improved Immunogenic Compositions and Vaccines Comprising Carrier Bacteria that Secrete Antigens. Provisional filed April 15, 2002. Formal filed April 15, 2003. (WITHDRAWN)

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
United States	Provisional			60/372,710		56029-31238
United States	Pending			10/414,532		56029-40437

20. Curtiss, R. III. Regulated Attenuation of Live Vaccines to Enhance Cross-Protective Immunogenicity. Provisional filed April 15, 2002 and April 18, 2002. Formal filed April 15, 2003. PCT filed April 15, 2003. Divisional EP 2 380 440 A1, filed Sept. 28, 2010.

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
United States	Provisional			60/372,616		56029-31335
				60/373,626		56029-32858
United States	Issued	8,133,493	3/13/12	10/511,616		56029-51044
PCT		WO 03/096812		PCT/US03/11802		56029-40434
Australia				2003235457		56029-51047
Canada				2,526,895		
Europe	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Austria	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Belgium	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Bulgaria	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Switzerland	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Cyprus	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Czech Republic	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Germany	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Denmark	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Estonia	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Spain	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Finland	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
France	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
United Kingdom	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Greece	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Hungary	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Ireland	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Italy	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Liechtenstein	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Luxemburg	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Monaco	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Netherlands	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Portugal	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Romania	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Sweden	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Slovenia	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Slovak Republic	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045
Turkey	Issued	1499191	5/9/12	03721711.4	4/15/23	56029-51045

21. Curtiss, R. III, and H. Y. Kang. Modulation of Immune Responses to Foreign Antigens Expressed by Recombinant Attenuated Bacterial Vectors. Provisional filed April 15, 2002 and April 18, 2002. Formal filed April 15, 2003.

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
United States	Provisional			60/372,676		56029-31336
				60/373,669		56029-32859
United States	Issued	7,195,757	3/27/07	10/414,533		56029-40420

22. Curtiss, R. III, and W. Kong. Regulated Bacterial Lysis for Gene Vaccine Vector Delivery and Antigen Release. Provisional filed Sept. 1, 2002. PCT filed Aug. 29, 2003.

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	DOCKET NO.
United States	Pending			10/526,365		
United States	Provisional			60/407,522		56029-35347
PCT		WO 2004/020643		PCT/US03/26883		56029-42524
Australia				2003278729		
Europe	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Austria	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Belgium	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Bulgaria	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Switzerland	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Cyprus	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Czech Republic	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Germany	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Denmark	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Estonia	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Spain	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Finland	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
France	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
United Kingdom	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Greece	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Hungary	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Ireland	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Italy	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Liechtenstein	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Luxemburg	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Monaco	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Netherlands	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Portugal	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Romania	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Sweden	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Slovenia	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Slovak Republic	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711
Turkey	Issued	1537214	3/1/06	03770256.0	8/29/23	56029-53711

23. Curtiss, R. III. Recombinant bacteria comprising vectors for expression of nucleic acid sequences encoding antigens. U.S. Provisional Patent Application No. 60/917,306, filed 5/10/07. PCT/US08/63303, filed 5/9/08. Publication No. WO 2008/141226. Europe Nationalized Application No. 08825819.9, Publication No. EP2152883, filed 5/9/08. (Internal Tech ID M7-012L)

24. Curtiss, R. III, S. Wang, S.Y. Wanda, and W. Kong. Regulated expression of antigen and/or regulated attenuation to enhance vaccine immunogenicity and/or safety. Provisional filed 5/10/07. PCT filed 5/9/08. Europe Nationalized Application No. 08827622.5, Publication No. EP2150616, filed 5/9/08.

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	INTERNAL TECH ID
United States	Issued	8,445,254	5/21/13	12/615,872		M7-011L
United States	Provisional			60/917,313		M7-011L
PCT		WO 2009/025888		PCT/US08/063293		M7-011L

25. Curtiss, R. III, M. Mellata, B. Zekarias, Z. Shi, C. Branger, and K. Roland. Recombinant bacterium capable of eliciting an immune response against enteric pathogens. *Salmonella* vaccine against bacterial enteric pathogens. Provisional filed 10/5/07. PCT filed 10/6/08.

COUNTRY	STATUS	PAT. NO.	ISSUE DATE	APPL. NO./ SERIAL NO.	EXPIRATION	INTERNAL TECH ID
United States	issued	8,465,755	7/18/13	12/681,721		M8-025L
United States	Provisional			60/978,084		M8-025L

PCT

WO 2009/046449

PCT/US08/078991

26. Curtiss, R. III, B. Zekarias, and K. Roland. Recombinant bacterium capable of eliciting a protective immune response against *C. perfringens*. U.S. Provisional Application No. 60/978,084, filed. 10/5/07. PCT/US08/78993, filed 10/6/08. Publication No. WO 2009/046451. (Internal Tech ID M8-062L)
27. Curtiss, R. III, and X. Liu. Nucleic acids, bacteria, and methods for degrading the peptidoglycan layer of a cell wall. (Patent on regulated lysis of cyanobacteria) U.S. Provisional Application No. 61/073/299, filed 06/17/08. PCT/US09/47681, filed 06/17/09. Publication No. WO 2009/155357. (Internal Tech ID M8-060L)
28. Curtiss, R. III, J. Santander Morales, S.Y. Wanda, and S. Wang, K. Brenneman, H. Shi, W. Xin, and Q. Kong. Recombinant bacterium capable of eliciting an immune response against *Streptococcus pneumoniae*. U.S. Provisional Application No. 61/106,367, filed 10/17/2008. PCT/US09/61100, filed 10/16/09. Publication No. WO 2010/045620. Nationalized PCT US13/088,141, filed 4/15/11. (Internal Tech ID M8-061L)
29. Curtiss, R. III, and X. Liu. Neutral lipid producing cyanobacterial. U.S. Provisional Application No. 61/142,551, filed 01/05/09. PCT/US10/20137, filed 01/5/10. Publication No. WO 2010/078584 (Internal Tech ID M9-017L)
30. Curtiss, R. III, and X. Zhang. A Single Expression Vector for Generation of a Virus with a Segmented Genome. U.S. Provisional Patent Application 61/168,996, filed 04/14/09. PCT/US12/759,842, filed 04/14/10. (Internal Tech ID M9-088L)
31. Curtiss, R. III, and J. Santander Morales. Recombinant *Edwardsiella* Bacterium. U.S. Provisional Application No. 61/182,569, filed 05/29/09. U.S. Patent Application 12/789,869, filed 5/28/10. PCT/US12/789,869, filed 05/28/10. (Internal Tech ID M9-119L)
32. Curtiss, R. III, and W. Kong. Recombinant bacterium for delivering plasmid DNA. U.S. Provisional Patent Application No. 61/180,620, filed 5/22/09. Recombinant bacterium and methods of antigen delivery. U.S. Application No. 61/222,306, filed 07/01/09. Recombinant bacterium and methods of antigen and nucleic acid delivery. PCT/US10/35630, filed 05/20/10. Publication No. WO 2010/135563. (Internal Tech ID M9-141L)
33. Curtiss, R. III, and X. Liu. Bacterium for production of fatty acids. U.S. Provisional Patent Application 61/255,729, filed 10/28/09; 61/307,185, filed 02/23/10, 61/382/156, filed 9/13/10. PCT/US10/54494, filed 10/28/10. Publication No. WO 2011/059745. U.S. Application 13,459,774, filed 04/30/12. (Internal Tech ID M10-056L; M10-122L; M11-015L).
34. Curtiss, R. III, and W. Sun. *Yersinia pestis* vaccine. U.S. Provisional Application No. 61/294,727, filed 01/13/10. Non-Provisional 13/006,072, filed 01/13/11. U.S. Publication No. US2011/0256177 A1. (Internal Tech ID M10-055L)
35. Curtiss, R. III, and Q. Kong. Bacterium comprising a regulated rfaH nucleic acid. (Induction of cross-protective immunity by over exposure and expression of cross-protective antigens) U.S. Provisional Application No. 61/297,315, filed 01/22/10. PCT/US11/22110, filed 1/21/11. Publication No. WO 2011/091291 A1. U.S. Patent Application 13/574,718, filed 7/23/12. (Internal Tech ID M10-037L)
36. Curtiss, R. III, and W. Kong Engineering self-destructing *Salmonella* as a cancer cure (Recombinant bacterium to decrease tumor growth). U.S. Provisional Application No. 61/349,425, filed 05/28/10. PCT/US2011/038588, filed 04/25/11. WO 2011/150421 A2. U.S. Patent Application 13/700,591, filed 11/28/12. (Internal Tech ID M10-154L)
37. Curtiss, R. III, and X. Liu. Cyanobacterium that produces neutral lipids (Compositions and methods for bacterial lysis and neutral lipid production). U.S. Provisional Application No. 61/361,116, filed 07/2/10. PCT/US2011/042821, filed 01/20/11. Publication No. WO 2012/003460 A2. U.S. Patent Application 13/805,733, filed 12/20/12. (Internal Tech ID M10-180L)
38. Curtiss, R. III, and S. Ashraf. Recombinant bacterium for induction of cellular immune responses. U.S. Provisional Application No. 61/619,307, filed 04/02/12. PCT/US13/31592, filed 03/14/13. (Internal Tech ID M10-133L)
39. Curtiss, R. III, and X. Liu. Photosynthetic microorganisms expressing thermostable lipase. U.S. Provisional Application No. 61/648,820 filed 05/18/12. (Internal Tech ID M12-068L)

40. Curtiss, R. III, M. Fisher, and R. Allen. Microbes with controlled adhesive properties. U.S. Provisional Application No. 61/657,242, filed 06/08/1 and U.S. Provisional Application No. 61/707,427, filed 09/28/12. PCT/US13/44978, filed 06/10/13. (Internal Tech ID M12-149L)

41. Curtiss, R. III, K. Brennenman, and K. Roland. Attenuated live bacteria with increased acid resistance and methods of use thereof. U.S. Provisional Application No. 61/836,140, filed 06/17/13. (Internal Tech ID M13-121L)

LICENSED VACCINES

1. Live attenuated *Salmonella choleraesuis* vaccine, Argus SC; APHIS registration19A1.00., October 23, 1997. Marketed by Intervet. See references 154 and 226 in CV.
2. Live attenuated *Salmonella typhimurium* vaccine for broilers, Megan Vac 1; APHIS registration19C1.01., November 25, 1998. Marketed by Lohmann Animal Health. See references 137, 139, 160, 164, 175, 177, 190, and 193 in CV.
3. Live attenuated *Salmonella typhimurium* vaccine for layers, Megan Egg; APHIS registration19C1.02., November 4, 2003. Marketed by Lohmann Animal Health. See reference 214 in CV.

POSTDOCTORAL FELLOWS

Former Postdoctoral Fellows and Research Associates

Shamaila Ashraf, PhD (2006-2010) – Arizona State University

Assistant Researcher, Department of Pediatrics, University of Wisconsin School of Medicine and Public Health, Madison, WI

PhD (Avian Virology), 2005, The Ohio State University, Wooster, OH, “Studies on infectious bursal disease virus”

Keith Ameiss, PhD (2005-2009) – Washington University and Arizona State University

PhD (Poultry Sciences), 2005, Texas A&M University, College Station, TX, “Effects of Cytosine-Phosphate-Guanosine Oligodeoxynucleotides (CpG-ODNs) on Oral Immunization with Protein Antigen or Replicating Parasite”

Yoshimitsu Abiko, PhD, DDS (1978-1980) - University of Alabama at Birmingham

Professor, School of Dentistry at Matsudo Department of Dentistry, Nihon University

PhD (Biochemistry), 1977, Nihon University, "Studies on Calcium-Stimulated Adenosine Triphosphatase in the Albino Rabbit Dental Pulp. Its Subcellular Distribution and Properties"

W. James Alexander, MD (1977-1979) - University of Alabama at Birmingham

Senior Vice President, Clinical and Regulatory Operations and Chief Medical Officer, BioCryst Pharmaceuticals, Inc., Birmingham, AL

MD, 1974, University of Mississippi

Iqbal Ibn Amin, MD, PhD, CMD (1993-1996) - Washington University

PhD (Microbiology), 1992, University of Birmingham, Birmingham, UK, "Studies on the invasiveness of *Salmonella typhimurium*"

Chang Ho-Baek, PhD (2003-2008) – Washington University and Arizona State University

Staff Scientist, Life Technologies, Carlsbad, CA

PhD (Microbiology), 2003, Sogang University, Seoul, Korea – “Physiological and genetic analyses of the utilization of the opine, deoxyfructosyl flutamine, as a compound mediating relationships between agrobacterium and plant”

John F. Barrett, PhD, (1982-1985) - University of Alabama at Birmingham and Washington University

(Deceased) Formerly, Executive Director, Anti-Infective Microbiology, Bristol-Myers Squibb, Pharmaceutical Research & Development Division, Wallingford, CT

PhD (Microbiology/Immunology), 1982, Temple University School of Medicine, "Kinetics and Mechanism of Hydrolysis of the N-acetylmuramyl-hydrolase of *Streptococcus faecium* 9790"

James R. Bonner, MD (1974-1976) - University of Alabama at Birmingham
Professor, Department of Pediatrics, Division of Allergy and Immunology, University of Alabama at Birmingham
MD, 1971, University of Michigan

Jean-luc Boucaud, DVM (1988-1989) - Washington University
DVM (Veterinary Medicine), 1987, Ecoles Nationales Veterinaire de Lyon

Christine Branger, PhD (2004-2008) - Washington University and Arizona State University
PhD (Biology), 2001, Nantes University, Nantes, France - "Protection against Leptospirosis: Studies of two genes of interest: *hap1* and *ompL1* encoding for respectively haemolysin and porine.

Karen Brennehan, PhD (2007-2012) - Arizona State University
Assistant Research Scientist, Biodesign Institute, Arizona State University, Tempe, AZ
PhD (Microbiology) 2007, The Ohio State University, Columbus, OH, "Investigation and characterization of the enhanced humoral response following immunization with the lethal and edema toxins of *Bacillus anthracis*"

Peter Brown, PhD (1992-1996) - Washington University
Centre for Immunology, St. Vincent's Hospital, Darlinghurst, New South Wales, Australia
PhD (Microbiology), 1992, University of Sydney, Australia, "Cloning and sequencing of the *rfb* gene cluster of a group C2 *Salmonella*: the evolutionary relationship with other serogroups"

Lisa Burns-Keliher, PhD (1991-1998) - Washington University
Applications/Software Support Scientist, Bioinformatics Group, Monsanto Corporation, St. Louis, MO
PhD (Medical Microbiology), 1990, Texas Tech University Health Sciences Center, "Involvement of lipopolysaccharide in expression of the major outer membrane protein OmpF in *Escherichia coli* K-12"

Josephine E. Clark-Curtiss, PhD (1973-1976) - University of Alabama at Birmingham
Professor, Arizona State University, School of Life Sciences and Biodesign Institute, Tempe, AZ
PhD (Microbiology), 1974, Medical College of Georgia, "A Molecular Characterization of the Genomes of the Compatible Mating Strains of *Nocardia erythropolis*"

Amiken Cohen, PhD (1966-1968) - Oak Ridge National Laboratory, TN
Professor Emeritus, Department of Microbiology, The Hebrew University of Jerusalem, Israel
PhD (Biochemistry), 1966, University of Pittsburgh, PA, "Biosynthesis of Complex Polysaccharides of the Yeast *Cryptococcus laurentii*"

Laurence Vincent Collins, PhD (1990-1994) - Washington University
Ingénieur de Recherche (PD), INSERM, Lyon, France
PhD (Microbial Pathogenesis), 1990, University of Adelaide, Australia, "The effect of mutations in lipopolysaccharide biosynthetic genes on the virulence of *Salmonella typhimurium* for the mouse"

Susan Cook, PhD (2003-2005) - Washington University
Assistant Director, Environmental Health and Safety and Biological Safety Officer, Washington University School of Medicine, St. Louis, MO
PhD (Molecular and Microbiology), 2003, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD - "Development of an in vivo imaging system to elucidate mechanisms of attenuation of Sindbis virus"

Rebecca C. Craven, PhD (1981-1984) - University of Alabama at Birmingham
Professor, Department of Microbiology & Immunology, The Pennsylvania State University, Hershey, Pennsylvania
PhD (Microbiology), 1981, University of Tennessee

France Daigle, PhD (1998-2001) - Washington University
Professor, Department of Microbiology and Immunology, University of Montreal
PhD (Microbiology & Immunology), 1996, University of Montreal, Montreal, Canada, "Genetic Studies of Virulence Factors Present in Extraintestinal *Escherichia coli* Strains"

- Yakhya Dieye, PhD (2005-2008) – Arizona State University
Senior Scientist Microbiology, Ondek Pty. Ltd., Australia
PhD (Bacterial Genetics), 2002, Université Paris 11, Orsay, France, "Targeting of heterologous proteins in lactic acid bacteria: toward the use of *Lactococcus lactis* as delivery vehicle of useful molecules in gut of the host"
- Teresa Ann Doggett, PhD (1989-1997) - Washington University
Dept. of Pharmacological and Physiological Sciences, St. Louis University School of Medicine, St. Louis, MO
PhD (Immunology), 1989, Plymouth Polytechnic, Devon, England, "Peripheral Blood, Intestinal Leucocytes and Antigen Absorption in the Gut of the Cichlid, *Oreochromis-mossambicus*"
- Charles Dozois, PhD (1997-2001) – Washington University
Professor, INRS-Institut Armand-Frappier, Laval Québec
PhD (Microbiology & Immunology), 1995, University of Montreal, Montreal, Canada, "Phenotypic and Genetic Analyses of P and Type I Fimbriae of Pathogenic *Escherichia coli* from Poultry"
- Joel Dworkin, M.D., Ph.D. (2001-2003) – Washington University
Ph.D. (Microbiology & Immunology), 1995, Vanderbilt University School of Medicine, Nashville, TN,
"Molecular Genetics of Campylobacter Fetus S-Layers: Studies of S-Layer Gene Organization, LPS-Binding Domains, and Expression"
M.D., 1997, Vanderbilt University School of Medicine, Medical Scientist Training Program (MTSB), Nashville, TN
- Joseph O. Falkinham III, PhD (1972-1974) - University of Alabama at Birmingham
Professor of Biology, Virginia Polytechnic Institute & State University, Blacksburg, VA
PhD (Microbiology), 1969, University of California-Berkeley, "Analysis of Linkage Relationships in a Double Male Strain of *Escherichia coli* K-12"
- Anne Cornish Frazer, PhD (1970-1974) - Oak Ridge National Laboratory and University of Alabama at Birmingham
Senior Scientist, QC Technology Development, Bayer Healthcare Pharmaceuticals, Berkeley, CA
PhD (Microbiology/Immunology), 1970, Tulane University, "Regulatory Properties of Pyruvate Kinase and a Preliminary Study of Four Additional Enzymes from the Metabolic Routes Interlocking at 3-Phosphoglycerate in *Thiobacillus neapolitanus*"
- Jorge E. Galan, PhD, DVSc, DVM (1986-1989) - Washington University
Professor and Chairman, Section of Microbial Pathogenesis, Yale University School of Medicine
PhD (Bacteriology), 1986, Cornell University, "Studies on the Immune Response of the Horse to the M Protein of *Streptococcus equi*"
DVSc (Veterinary Science), 1982, National University of La Plata
DVM (Veterinary Medicine), 1980, National University of La Plata
- Claudia Gentry-Weeks, PhD (1985-1989) - Washington University
Associate Professor, Department of Microbiology, Immunology, and Pathology, Colorado State University, Fort Collins, CO
PhD (Microbiology), 1985, University of Oklahoma Health Science Center, "Cloning and Nucleotide Sequence of the Structural Gene for Type A Streptococcal exotoxin (erythrogenic toxin) from *Streptococcus pyogenes* Bacteriophage T12"
- Gurnam S. Gill, PhD (1976-1980) - University of Alabama at Birmingham
Research Scientist, The Upjohn Company, Kalamazoo, MI
PhD (Medical Biophysics), 1976, University of Toronto, Canada, "Studies on Chromosomal Organization and Transcription in the Bacteriophage T1"
- Louis Glatzer, PhD (1970-1972) - Oak Ridge National Laboratory
Professor Emeritus, University of Toledo, Toledo, OH
PhD (Zoology), 1970, University of Texas in Austin, "Studies on the Acetohydroxy Acid Synthetase of *Neurospora crassa* Mitochondria"
- Jon D. Goguen, PhD (1980-1982) - University of Alabama at Birmingham

Associate Professor of Molecular Genetics & Microbiology, University of Massachusetts Medical School,
Worcester, MA
PhD (Zoology), 1980, University of Massachusetts, "Population Biology of a Conjugative Plasmid: Effects of Surface Populations of Bacteria"

Raul M. Goldschmidt, PhD (1974-1976) - University of Alabama at Birmingham
R.W. Johnson Pharmaceutical Research Institute, Raritan, NJ
PhD (Biology), 1970, Columbia University, "Degradation of Polypeptides Synthesized by Nonsense Mutants of the *laeZ* gene in *Escherichia coli*"

Paul A. Gulig, PhD (1985-1988) - Washington University
Professor, Department of Molecular Genetics and Microbiology, University of Florida College of Medicine, Gainesville, FL
PhD (Microbiology), 1985, University of Texas Health Science Center-Dallas, "Studies of Outer Membrane Antigens of *Haemophilus influenzae* type b as Potential Vaccine Candidates"

John H. Hanlin, PhD (1984-1985) - Washington University
Vice President of Public Health, Ecolab Inc.
PhD (Biology and Microbiology), 1984, Syracuse University, "The Mechanism of Heat Resistance of Bacterial Spores"

Jeffrey B. Hansen, PhD (1978-1981) - University of Alabama at Birmingham
Formerly Senior Reporter, The Birmingham News, Birmingham, AL
PhD (Microbiology), 1978, University of Michigan, Ann Arbor MI, "Plasmids of *Pseudomonas*"

Jubril Olugbenga Hassan, PhD (1989-1994) - Washington University
PhD (Immunology), 1989, University of Birmingham, England, "Some Aspects of Humoral and Cellular Immune Response to *Salmonella typhimurium* Infection in Chickens"

Robert G. Holt, PhD (1978-1982) - University of Alabama at Birmingham
Professor, Department of Microbiology, Meharry Medical College, Nashville, TN
PhD (Biomedical Sciences), 1978, University of Tennessee-Knoxville, Graduate School of Biomedical Sciences, Oak Ridge National Laboratory, "Studies of the Ribonucleotide Reductase in *Pseudomonas stutzeri*"

Allen L. Honeyman, PhD (1988-1991) - Washington University
Associate Professor, Texas A & M Health Science Center, Baylor College of Dentistry, Dallas, TX
PhD (Microbiology), 1987, University of Kansas, "Characterization of the *rodC* Locus of *Bacillus subtilis*"

JeMin Charles Hsu, PhD (1975-1979) - University of Alabama at Birmingham
(Deceased) Formerly, Senior Scientist, Rohm and Haas, Spring House, PA
PhD (Microbiology), 1975, Clemson University, "Microbial Degradation of a Family of Herbicides 4-Hydroxy-3,5-Dihalogeno-4-hydroxybenzotrioles"

Rui Huang, PhD (2001) - Washington University
Professor and Director, School of Basic Medical Sciences and Life Sciences, Soochow University, Suzhou, Jiangsu, P. R. China
PhD (Microbiology), 2000, Shanghai Medical University, Shanghai, P. R. China, "Study on the Biological Characteristics Mediated by Drug Resistant *Salmonella typhi* R Plasmid (pR_{ST98})"

Michael C. Hudson, PhD (1987-1990) - Washington University
(Deceased) Formerly, Professor of Biology, Department of Biology, University of North Carolina at Charlotte, Charlotte, NC
PhD (Microbiology), 1987, University of Kansas, "Transcription Initiation in *Staphylococcus aureus*"

Thomas A. Hughes, PhD (1981-1983) - University of Alabama at Birmingham
Professor, Department of Biological Sciences, Clemson University, Clemson, SC
PhD (Microbiology), 1981, North Carolina State University

Richard A. Hull, PhD (1976-1978) - University of Alabama at Birmingham

Formerly, Associate Professor of Microbiology, Baylor College of Medicine, Houston, TX
 PhD (Microbiology), 1976, University of Arizona, "Interference of Plasmids upon Bacteriophage Growth"

Sheila I. Hull, PhD (1974-1978) - University of Alabama at Birmingham
 Formerly, Associate Professor of Microbiology, Baylor College of Medicine, Houston, TX
 PhD (Microbiology), 1975, University of Arizona, "Cell Division in *Bacillus subtilis*"

Matsuhisa Inoue, PhD (1976-1978) - University of Alabama at Birmingham
 Chief Professor, Department of Microbiology, Kitasato University School of Medicine, Sagamihara, Japan
 PhD (Microbiology), 1976, Gunma University

Elizbieta K. Jagusztyn-Krynicka, PhD (1979-1981) - University of Alabama at Birmingham
 Professor, Institute of Microbiology, Department of Bacterial Genetics, University of Warsaw, Warsaw, Poland
 PhD (Microbiology), 1979, Institute of Microbiology, University of Warsaw, "Repair of Damage in DNA Molecules Caused by Disintegration of Incorporated ³²P DNA Radiophosphorus Atoms"

Maria Dolores Juarez-Rodriguez, PhD (2003-2005; 2006-2011) - Washington University and Arizona State University
 Postdoctoral Scholar, University of Louisville, Louisville, KY
 PhD (Biomedical Basic Research), 2002, Universidad Nacional Autónoma de México, Mexico City, Mexico, "Molecular characterization of the gene coding for the Rv2874 (DipZ) protein and its relationship with the mpt83-mpt70 locus of *Mycobacterium tuberculosis*"

Ho Young Kang, PhD (1997-2002) - Washington University
 Assistant Professor, Division of Biological Sciences-Microbiology, Pusan National University, Pusan, Korea
 PhD (Microbiology & Immunology), 1997, East Carolina University School of Medicine, Greenville, NC, "Identification and Characterization of the *Bordetella pertussis* Alcaligin Siderophore Biosynthesis Operon"

George G. Khachatourians, PhD, RM (CCM) (1971-1973) - University of Tennessee-Oak Ridge
 Professor, Department of Applied Microbiology and Food Science, College of Agriculture, University of Saskatchewan, Saskatoon, Canada
 PhD (Microbiology), 1971, University of British Columbia, "Pleitrophic Effect of dnaA Gene on Initiation of DNA Replication and Cell Division in *Escherichia coli*"

Qingke Kong, PhD (2005-2009) - Arizona State University
 Assistant Research Professor, Biodesign Institute, Arizona State University, Tempe, AZ
 PhD (Microbiology), 2004, Nankai University, Tianjin, P.R. China, "Sequence of the *E. coli* O-antigen clusters and identification of sugar biosynthesis genes"

Wei Kong, PhD (2001-2007) - Washington University and Arizona State University
 Assistant Research Professor, Biodesign Institute, Arizona State University, Tempe, AZ
 PhD (Microbiology and Molecular Genetics), 2000, Kyushu University, Fukuoka, Japan, "A novel peroxiredoxin of the plant *Sedum lineare* is a homologue of *Escherichia coli* bacterioferritin co-migratory Protein (Bcp)"

Vjollca Konjufca, PhD (2002-2007) - Washington University and Arizona State University
 Assistant Professor, Southern Illinois University, Carbondale, IL
 PhD (Avian Immunology), 2002, University of Arkansas, Fayetteville, AR, "Modulation of immune system development and function in broilers by dietary vitamin E"

Marcel Koopman, PhD (1993-1994) - Washington University
 Research and Development Manager-Chiron Corporation, Europe
 PhD (Biology), 1992, Utrecht University, The Netherlands, "Characterization of *Serpulina hyodysenteriae* periplasmic flagella and hemolysin.

Wayne B. Lanier, Jr., PhD (1966-1967) - University of Tennessee-Oak Ridge
 PhD (Biophysics and Theoretical Biology), 1966, University of Chicago, "Recovery of Alleles of Specific Nutritional Markers in Sexual and Parasexual Crosses in *Aspergillus nidulans* as a Function of the Composition of the Recovery Medium"

In Soo Lee, PhD (2001-2002) - Washington University

Associate Professor, Department of Microbiology, Han Nam University, Taejon, South Korea

PhD (Microbiology), 1993, Han Nam University, Taejon, South Korea, "Distribution of Metal Ion-Tolerant Bacteria in Uranium Ores at Ogcheon Basin and Mechanisms of Detoxification for $V_2O_5(V)$ in *Bacillus cereus* LP40"

Margie D. Lee, DVM, PhD (1990-1992) - Washington University

Professor, Department of Population Health, University of Georgia, Athens, GA

PhD (Microbiology), 1990, University of Georgia, "An Evaluation of the Virulence Relationship of Invasiveness, Endotoxin Release, and Complement Resistance of Avian Strains of *Pasteurella multocida*"

DVM (Veterinary Medicine), 1986, Virginia Maryland Regional College of Veterinary Medicine

Tae Ho Lee, PhD (2001-2002) - Washington University

Professor, Division of Biological Sciences-Microbiology, Pusan National University, Pusan, Korea

PhD (Applied Microbiology), 1980, Osaka Prefecture University, Osaka, Japan, "Study on the Structure of Red Yeast Cell Wall"

Yuhua Li, MD (2005-2009) - Arizona State University

Associate Professor, Hematology Department, Zhujiang Hospital, P.R. China

MD (Internal Medicine), 2001, First Military Medical University, Guangzhou, P.R. China, "Effects of Ly49A transfected lymphocytes on experimental graft versus host disease post allogeneic bone marrow transplantation"

Xinyao Liu, PhD (2007-2011) - Arizona State University

Staff Scientist, Sapphire Energy, Inc., San Diego, CA

PhD (Biotechnology), 2007, Peking University, Beijing, P.R. China, "The characteristics of anticyanobacterial microorganisms: grazing amoeba W2 and cyanophage Pf-WMP3 and Pf-WMP"

Yingqin Luo, PhD (2008-2012) - Arizona State University

PhD (Bioinformatics) 2008, Beijing Normal University, Beijing, P.R. China, "Phylogenetic analysis of the prokaryotic genome evolution with genome-wide conservation of overlapping genes"

David L. MacLeod, PhD (1991-1993) - Washington University

PhD (Veterinary Microbiology), 1990, University of Guelph, "Shiga-like Toxin II Variant: Purification, Characterization, and Role in Edema Disease"

Francis L. Macrina, PhD (1972-1974) - University of Alabama at Birmingham

Vice President for Research, Virginia Commonwealth University, Richmond, VA

PhD (Molecular Biology), 1972, Syracuse University, "Genetic and Physical Characterization of Stable F'*lac* Plasmid"

Gregory G. Mahairas, PhD (1990-1993) - Washington University

Director of High Throughput Genomics Center, University of Washington, Seattle, WA

PhD (Immunobiology), 1989, Iowa State University, "Molecular Genetic Approaches to Studying *Mycoplasma pulmonis* Virulence"

John J. Maurer, PhD (1990-1993) - Washington University

Professor, Department of Population, The University of Georgia, Athens, GA

PhD (Microbiology), 1990, University of Texas Health Science Center at San Antonio, "Molecular Analysis of Lipoteichoic Acid from *Streptococcus agalactide*"

Melha Mellata, PhD (2004-2007) - Washington University and Arizona State University

Assistant Research Professor, Biodesign Institute, Arizona State University, Tempe, AZ

PhD (Microbiology and Immunology), 2003, Université de Montréal Faculté de Médecine Vétérinaire (GREMIP), PQ, Canada, "Role of virulence factors of avian pathogenic *Escherichia coli* in colibacillosis"

Brian Morrow, PhD (1994-1999) - Washington University

Senior Scientist, Infectious Diseases Drug Discovery, Johnson and Johnson Pharmaceutical Research and Development, San Diego, CA

PhD (Biology) 1994, University of Iowa, Iowa City, Iowa, "Cloning and characterization of two genes regulated with phenotype switching in the pathogenic yeast *Candida albicans*"

- Sathish Mundayoor, PhD (1986 -1989) – Washington University
Senior Scientist, Rajiv Ghandi Centre for Biotech, New Delhi, India
PhD (Microbiology/Immunology), 1984, All India Institute of Medical Sciences, "The Role of Macrophages in the Maintenance of *M. leprae* and in the Modulation of Immune Responses in Leprosy"
- Maneesha Muralinath, PhD (2005-2009) – Arizona State University
Instructor, School of Life Sciences, Arizona State University, Tempe, AZ
PhD (Molecular and Cellular Biology), 2003, Arizona State University, Tempe, AZ, "The role of the amino terminus of E3L in vaccinia virus pathogenesis"
- C. K. Krishnan Nair, PhD (1978-1979) - University of Alabama at Birmingham
Professor of Radiation Biology, Amala Cancer Research Centre, Trichur, Kerala
PhD (Biochemistry), 1977, University of Bombay, "Some Aspects of DNA Replication and Repair"
- Koji Nakayama, DDS, PhD (1986-1988) - Washington University
Professor, Department of Microbiology, School of Dentistry, Nagasaki University, Nagasaki, Japan
PhD (Microbiology), 1984, Kyushu University, "The Genetic Study of the Mechanism for Thymineless Death in *Escherichia coli*"
DDS (Dentistry), 1977, Kyushu University
- Amiya R. Nayak, PhD (1991-1996) - Washington University
Wyeth Lederle Vaccines & Pediatrics, New York
PhD (Immunology), 1989, Utkal University, Orissa, India, "Some Fascinating Problems on the Biochemistry and Immunology of the Mycobacteria"
- Warren E. Nesbitt, PhD (1982-1985) - University of Alabama at Birmingham and Washington University
PhD (Microbiology and Immunology), 1982, University of Louisville, "Adherence of *Streptococcus sanguis*"
- Cheryl A. Nickerson, PhD (1994-1998) - Washington University
Professor, School of Life Sciences and Biodesign Institute, Arizona State University, Tempe, AZ
PhD (Microbiology), 1994, Louisiana State University, Baton Rouge, LA, "Role of Curved DNA in Promoter Recognition with *Bacillus subtilis* and *Escherichia coli* RNA Polymerase"
- Anjana Raina, PhD (1992-1994) - Washington University
PhD (Molecular Biology), 1991, Jawaharlal Nehru University, New Delhi, India, "Purification of seed storage proteins of *Amaranthus hypochondriacus* and cloning of the gene"
- Michael Rozinov, PhD (1990-1991) - Washington University
PhD (Molecular Biology), 1980, Institute for Genetics and Selection of Industrial Microorganisms, "Cloning of the Threonin Operon Genes of *E. coli*"
- Shigeno Saito, PhD (1980-1983) - University of Alabama at Birmingham
Assistant Professor, Department of Biochemistry, Nihon University School of Dentistry at Matsudo, Japan
PhD (Biochemistry), 1974, Tohoku University, Sendai, Japan, "Mucopolysaccharides of Rat Ascites Hepatoma Cells"
- Federico Sebastiani, PhD (1992-1994) - Washington University
Assistant Professor, Universidad Nacional Agraria La Molina, Facultad de Ciencias, Departamento de Biología
PhD (Plant Biology), 1992, Washington University, St. Louis, MO, "Topological signals for sorting the α subunit of β -conglycinin to seed protein bodies of soybean (*Glycine max*) using yeast as heterologous model system"
- Shlomo Sela, PhD (1988-1991) - Washington University
Scientist, Food Science Agricultural Research Organization, Israeli Ministry of Agriculture, Jerusalem, Israel
PhD (Microbiology), 1986, Hebrew University, "Classification of *Eubacteria* at the Level of Genus/Family, Using Highly Conserved Genes"
- Xiaoying Shen, PhD (2003-2004) – Washington University
Medical Instructor, Department of Medicine, Duke University, Durham, NC

PhD (Comparative Pathology), 2004, University of California, School of Veterinary Medicine, Davis, CA, "Evaluation of an FIV live-attenuated proviral DNA vaccine in newborn kittens"

Huoying Shi, PhD (2007-2010) - Arizona State University

Professor, College of Veterinary Medicine, Yangzhou University, P.R. China

PhD, 2005, College of Veterinary Medicine, Yangzhou University, P.R. China, "Molecular basis for spread of influenza A virus by reverse genetics"

Zhaoxing Shi, PhD (2005-2008) - Arizona State University

Assistant Research Scientist, Biodesign Institute, Arizona State University, Tempe, AZ

PhD (Genetics), 2002, Beijing Institute of Biotechnology, Beijing, P.R. China, "Interaction between HeLa cell and *Shigella flexneri* 2a"

Maria L. Smorawska, PhD (1977-1979) - University of Alabama at Birmingham

Research Associate, Department of Microbiology, University of Warsaw, Poland

PhD (Microbiology), 1976, University of Warsaw

Grace S. Spatafora, PhD (1988-1991) - Washington University

Irene Heinz and John Laporte Given Professor in the Pre-medical Science, Department of Biology, Middlebury College, Middlebury, VT

PhD, 1988, St. Louis University, "Characterization and Expression of Tubulin Genes During the Dimorphic Transitions of the Pathogenic Fungus, *Histoplasma capsulatum*"

Jay Srinivasan, PhD (1991-1996) - Washington University

PhD (Life Sciences), 1991, Jawaharlal Nehru University, New Delhi, India, "Construction and Development of a Vaccinia Based Recombinant Antifertility Vaccine"

Christos Stathopoulos, PhD (1996-2000) - Washington University

Associate Professor of Microbiology, Biological Sciences Department, California State Polytechnic University, Pomona, CA

PhD (Biology & Microbiology), 1995, The University of Texas at Austin, "Export, topology, and biotechnological applications of *Escherichia coli* outer membrane proteins". 2001, University of Houston, Department of Biology and Biochemistry, Houston Science Center.

Sidney H. Stein, DMD, MS, PhD (1986-1987) - Washington University

Chair, Associate Professor, Undergraduate Clinic Director, College of Dentistry, Periodontology, The University of Tennessee Health Science Center, Memphis, TN

DMD, 1983, Washington University School of Dental Medicine

Gerald J. Stine, PhD (1963-1966) - Oak Ridge National Laboratory

Park University of North Florida, Jacksonville, FL

PhD (Biology), 1965, University of Delaware

Jin-Wu Sun, (1989-1997) - Washington University

Genome Systems, St. Louis, MO

BS/MS Biochemistry, Beijing University, Beijing, China

Wei Sun, PhD (2006-2010) - Arizona State University

Assistant Research Professor, Biodesign Institute, Arizona State University

PhD (Microbiology and Biochemical Pharmacy), 2004, Shanghai Institute of Pharmaceutical Industry, Shanghai, P.R. China, "Screening (-lactamase inhibitor with yeast two-hybrid system"

Rupinder Tewari, PhD (1989-1991) - Washington University

Professor, Center for Microbial Biotechnology, Panjab University, Chandigarh, India

PhD (Microbiology), 1986, London University, "Role of Colicin V Plasmids in the Virulence of *E. coli*"

Ascención Torres-Escobar, PhD (2004-2005; 2006-2007) - Washington University and Arizona State University

Postdoctoral Scholar, University of Louisville, Louisville, KY

PhD (Biomedical Basic Research), 2001, Universidad Nacional Autónoma de México, Mexico City, Mexico, "Molecular characterization of the gene coding the 38 kDa and the *Mycobacterium tuberculosis* regulon *pho* in *Mycobacterium smegmatis*"

Krishnan Thankavel, PhD (1993-1994) - Washington University
Depts. of Microbiology and Pathology, Duke University Medical Center, Durham, NC
PhD (Biochemistry), 1989, Annamalai University, India, "Larval development, yolk utilization and effect of starvation on the larval development of the estuarine crab *Thalamita crenata*"

Jelle Thole, PhD (1988-1989) - Washington University
Wageningen University and Research Centre, Animal Sciences Group, Lelystad, Netherlands
PhD (Medicine), 1988, Amsterdam University, "A Major Immunogenic Mycobacterial Antigen: Its Molecular Characterization and its Implication in Adjuvant Arthritis"

Caihong Wang, DVM, PhD (2003-2004) - Washington University
Staff Scientist, Department of Obstetrics and Gynecology, Washington University, St. Louis, MO
PhD (Veterinary Pathology and Immunology), 1998, China Agricultural University, P.R. China – "Immune responses of head-associated lymphoid tissue to eye application of Newcastle disease vaccine in chicken."

Shifeng Wang, PhD (2003-2007) - Washington University and Arizona State University
Assistant Research Professor, Biodesign Institute, Arizona State University, Tempe, AZ
PhD (Microbiology and Immunology), 2003, Chinese Academy of Preventive Medicine, Beijing, P.R. China, "Characters of codon usage in viruses and its effect on gene expression"

Mary Wilmes-Riesenberg PhD (1991-1998) - Washington University
Lead Business Analyst, bioMerieux, St. Louis, MO
PhD 1991, Purdue University, West Lafayette, IN, "Investigating the Regulation of Bacterial Alkaline Phosphatase (BAP) synthesis in *phoR* mutants of *Escherichia coli*"

Wei Xin, PhD (2005-2009) - Arizona State University
Assistant Research Scientist, School for Engineering of Matter, Transport and Energy, Arizona State University
PhD (Microbiology and Immunology), 2004, National Institute for Viral Disease Control and Prevention, Beijing, P.R. China – "Expression of multi-antigen of HIV Botswana strain in vaccinia virus and immunogenicity study of HIV early-express protein in mice"

Bereket Zekarias, DVM, PhD (2004-2008) - Washington University and Arizona State University
Project Manager, CEVA Biomune, Shawnee Mission, KS
PhD (Animal Pathology), 2003, Utrecht University, Utrecht, The Netherlands, "Pathogenic factors in susceptibility differences to malabsorption syndrome and amyloid arthropathy in chickens"
DVM (Veterinary Medicine), 1995, Addis Ababa University

Xiangmin Zhang, PhD (2006-2010) - Arizona State University
Research Scientist, Program Metabolic Biology, Arizona State University, Tempe, AZ
PhD (Microbiology and Immunology), 2005, National Institute for Viral Disease Control and Prevention, Beijing, P.R. China, "The study of effect of codon bias on the gene expression efficiency in vaccinia virus vector"

Current Postdoctoral Fellows and Associates:

Stephen J. Forbes, PhD (2011-Present) - Arizona State University
PhD (Biomedical Sciences), 2009, University at Albany, SUNY, Albany, NY, "Effect of Anti-Lipopolysaccharide IgA Antibodies on the Virulence and Physiology of *Salmonella enterica* and *Shigella flexneri*"

Michael L. Fisher, PhD (2010-Present) - Arizona State University
PhD (Molecular Microbiology), 2008, Tufts University, Boston, MA, "A role for bacterial virulence factors in a newly defined model of pneumonic yersiniosis"

Yanlong Jiang, PhD (2010-Present) - Arizona State University

PhD (Preventive Veterinary Medicine), 2009, Northeast Agriculture University, Harbin, P.R. China, "Construction of cDNA and whole genome sequencing of Newcastle Disease Virus Strain V4"

Paweł Łaniewski, PhD (2012-Present) - Arizona State University

PhD (Biology), 2012, University of Warsaw, "Anti-*Campylobacter* immunoprophylaxis – construction of bacterial vaccine prototypes producing chickens cytokines and *Campylobacter* antigens"

GRADUATE STUDENTS

Current Students

Rebecca Allen, Arizona State University, PhD Student

Former Students

Raul Barletta, Professor, School of Veterinary Medicine and Biomedical Sciences, University of Nebraska, Lincoln, NE

PhD, 1987 - University of Alabama at Birmingham - "Biochemistry, Genetics, and Role in Virulence of Glucosyltransferase A from *Streptococcus mutans*"

Claire M. Berg (Deceased) Formerly, Professor of Genetics, University of Connecticut, Storrs, CT

PhD 1966, Columbia University, "Replication and Genetic Exchange in the Genome of *Escherichia coli* K-12"
Research conducted in the Biology Division, Oak Ridge National Laboratory, Oak Ridge, TN

Guy A. Cardineau, Director and Professor, Centro de Agrobiotecnología, Tec de Monterrey, Monterrey, Mexico

PhD, 1986, University of Alabama at Birmingham, "Characterization of the *Streptococcus mutans* Gene for Aspartate β - semialdehyde Dehydrogenase: Identification of Sequences Involved in Gene Expression and Their Use in Vector Construction"

Raymond G. Fenwick, Jr., Formerly Associate Professor of Biochemistry, Dalhousie University, Halifax, Nova Scotia, Canada

PhD, 1973, The University of Tennessee, "Conjugal DNA Replication by *Escherichia coli* K-12"

Lingyu Guan, East China University of Science and Technology, Shanghai, P.R. China

Co-Cultivation Doctoral Program, 2010-2012

William R. Jacobs, Jr., Professor, Department of Microbiology and Immunology; Professor, Department of Molecular Genetics, and Investigator, Howard Hughes Medical Institute, Albert Einstein College of Medicine, New York

PhD, 1985, University of Alabama at Birmingham, "Construction and Analyses of Genomic Libraries of *Mycobacterium leprae* DNA"

Randall T. Jones (Deceased)

PhD, 1969, The University of Tennessee, "Genetics of Bacteria in vivo as Related to Microbial Ecology"
Research conducted in the Biology Division, Oak Ridge National Laboratory, Oak Ridge, TN

Hank A. Lockman, Principal Research Scientist, Battelle Memorial Institute Research, Columbus, OH

PhD, 1991, Washington University, "Motility and Adherence as *Salmonella typhimurium* Virulence Factors: The Pathogenesis of *fla*, *mot*, and *fim* mutants in murine typhoid fever"

Larry J. Maturin, Supervisory Microbiologist, Center for Food Safety and Applied Nutrition, Summit-Argo, IL

PhD, 1979, University of Alabama at Birmingham, "Role of RNA Synthesis in Conjugational Transfer of Chromosomal and Plasmid DNA"

Anthony T. Maurelli, Professor, Department of Microbiology, Uniformed Services University of the Health Sciences, Bethesda, MD

PhD, 1983, University of Alabama at Birmingham, "Studies on the Genetics of Pathogenicity of *Shigella flexneri* 2a"

Dennis A. Pereira, (Deceased) Formerly, Principal Research Investigator/Applied Biotechnology, Pfizer Research Center, Groton, CT

PhD, 1979, University of Alabama at Birmingham, "Construction of Safer *Escherichia coli* for Use in Recombinant DNA Experimentation"

Stephen R. Petteway, Jr., Executive Vice President, Research and Development, Talecris Biotherapeutics, Clayton, NC
PhD, 1981, University of Alabama at Birmingham, "Cloning and Characterization of Procollagen cDNA"

David L. Provence, Patent Attorney, Muetting & Raasch, Minneapolis, MN
PhD, 1994, Washington University, "Environmental Control, Genetic Basis, and Post-Translational Processing of a Hemagglutinin Expressed by Avian Pathogenic *Escherichia coli*"

James P. Robeson, Professor, Instituto de Biologia, Universidad Catolica de Valparaiso, Valparaiso, Chile
PhD, 1981, University of Alabama at Birmingham, "Expression of a *Streptococcus mutans* Glucosyltransferase in *Escherichia coli* K-12"

Kenneth J. Roozen, Formerly, Executive Director of the Medical University of South Carolina, Foundation for Research Development
PhD, 1971, The University of Tennessee, "Studies Using Plasmid-Containing Minicells of *Escherichia coli* K-12"

Javier Santander-Morales, Director, Nucleus for Interdisciplinary Biotechnology; Assistant Professor, Universidad Mayor, Chile
PhD, 2012, Arizona State University, "Evolutionary conserved genes of *Edwardsiella ictaluri* towards the development of a live attenuated recombinant vaccine for the aquaculture industry"

Shihuan Shao
MSc, 2012, Arizona State University, "Effects of Cyclic Adenosine Monophosphate Independent Cyclic Adenosine Monophosphate Receptor Protein in Recombinant Attenuated *Salmonella* Vaccines"

Ronald J. Sheehy, Formerly, Assistant Vice President for Academic Affairs, Morehouse College, Atlanta, GA
PhD, 1972, The University of Tennessee, "Molecular Studies on *Escherichia coli* and *Salmonella typhimurium* Minicells"

Zhao Yang, East China University of Science and Technology, Shanghai, P.R. China
Co-Cultivation Doctoral Program, 2008-2010

RESEARCH AND TRAINING SUPPORT

PAST SUPPORT UNIVERSITY OF ALABAMA AT BIRMINGHAM (Only Direct Costs Listed):

NIH/NIDR DE02670 - Institute of Dental Research

Subproject: Extrachromosomal Elements in Streptococci

01	Jun. 1, 1972-May 31, 1973	\$25,000
02	Jun. 1, 1973-May 31, 1974	39,956
03	Jun. 1, 1974-May 31, 1975	36,331
04	Jun. 1, 1975-May 31, 1976	46,496
05	Jun. 1, 1976-May 31, 1977	53,849
06	Jun. 1, 1977-Mar. 29, 1978	44,969

Subproject: Genetic and Biochemical Bases for *S. mutans* Virulence

07	Mar. 30, 1978-Feb. 28, 1979	\$89,192
08	Mar. 1, 1979-Feb. 28, 1980	91,230
09	Mar. 1, 1980-Feb. 28, 1981	91,720
10	Mar. 1, 1981-Feb. 28, 1982	84,593
11	Mar. 1, 1982-Feb. 28, 1983	76,853
12	Mar. 1, 1983-Aug. 31, 1983	26,306

NSF GB-37546 - Mechanisms of Genetic Recombination in *Escherichia coli*

	Mar. 15, 1973-Aug. 31, 1975	\$75,000
	Jun. 1, 1975-Nov. 30, 1977	80,000

NSF GMS-73-06837 - Transmission of Genetic Information in *E. coli*

Jan. 15, 1978-Jun. 30, 1980	\$82,000
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Merck & Co., Inc. #Q-0141 -Population Shifts in the Microbial Flora of the Oral Cavity as Affected by Alexidine

May 15, 1973-Dec. 15, 1973	\$26,921
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NIH/NIAID R01 AI11456 - Extrachromosomal Elements in Gram-negative Bacteria

01	Jun. 22, 1973-Apr. 30, 1974	\$27,195
01S	May 1, 1974-Oct. 31, 1974	3,000
02	May 1, 1974-Apr. 30, 1975	22,208
03	May 1, 1975-Apr. 30, 1976	23,318
04	May 1, 1976-Apr. 30, 1977	53,500
05	May 1, 1977-Apr. 30, 1978	40,900
06	May 1, 1978-Apr. 30, 1979	43,492
07	May 1, 1979-Apr. 30, 1980	46,291
08	May 1, 1980-Apr. 30, 1981	49,314

NIH/NIGMS T32 GM 07090 - Molecular, Cellular, and Medical Genetics

01	Jul. 1, 1975-Jun. 30, 1976	\$50,833
02	Jul. 1, 1976-Jun. 30, 1977	53,930
03	Jul. 1, 1977-Jun. 30, 1978	55,105
04	Jul. 1, 1978-Jun. 30, 1979	55,861
05	Jul. 1, 1979-Jun. 30, 1980	56,729
06	Jul. 1, 1980-Jun. 30, 1981	80,552
07	Jul. 1, 1981-Jun. 30, 1982	84,552
08	Jul. 1, 1982-Jun. 30, 1983	74,552
09	Jul. 1, 1983-Jun. 30, 1984	57,405
10	Jul. 1, 1984-Jun. 30, 1985	105,690

NIH/NIGMS T32 GM 07164 - Predoctoral Training in Molecular Cell Biology

01	Jul. 1, 1975-Jun. 30, 1976	\$63,781
02	Jul. 1, 1976-Jun. 30, 1977	59,945
03	Jul. 1, 1977-Jun. 30, 1978	82,190
04	Jul. 1, 1978-Jun. 30, 1979	86,026
05	Jul. 1, 1979-Jun. 30, 1980	86,026

NIH/NIAID N01 AI62508 - Construction of Safer *E. coli* Hosts for Phage and Plasmid Vectors

Jun. 1, 1976-Dec. 29, 1977	\$178,124
Dec. 30, 1977-Dec. 29, 1978	129,754

NIH/NIDR N01 DE62491 - Use of Mutants of Cariogenic Streptococci to Prevent Dental Caries

01	Jun. 28, 1976-Jun. 27, 1977	\$18,635
02	Jun. 28, 1977-Jun. 27, 1978	20,399
03	Jun. 28, 1978-Jun. 27, 1979	22,127
03S	Jan. 1, 1980-Mar. 31, 1980	5,649
04	Apr. 1, 1980-Mar. 31, 1981	40,681
05	Apr. 1, 1981-Mar. 31, 1982	32,735

NIH/NIAID T32 AI07041 - Infectious Diseases and Basic Microbiology Training

01	Jul. 1, 1976-Jun. 30, 1977	\$51,233
02	Jul. 1, 1977-Jun. 30, 1978	101,095
03	Jul. 1, 1978-Jun. 30, 1979	101,095
04	Jul. 1, 1979-Jun. 30, 1980	101,095
05	Jul. 1, 1980-Jun. 30, 1981	127,526
06	Jul. 1, 1982-Jun. 30, 1983	98,514
07	Jul. 1, 1983-Jun. 30, 1984	112,659
08	Jul. 1, 1984-Jun. 30, 1985	113,919
09	Jul. 1, 1985-Jun. 30, 1986	115,304

10	Jul. 1, 1986-Jun. 30, 1987	116,828
Damien Foundation - Genetic Analysis of <i>Mycobacterium leprae</i>		
	Jun. 1, 1979-May 31, 1980	\$41,200
WHO ID #790 403 - Genetic Analysis of <i>Mycobacterium leprae</i>		
	Jun. 1, 1980-Jun. 30, 1981	\$54,400
	Jun. 1, 1981-May 31, 1982	76,000
WHO ID #790 403 - Genetic Analysis of <i>Mycobacterium leprae</i>		
	Jul. 1, 1982-Jun. 30, 1983	\$73,700
NIH/NIDR R01 DE06432 - Use of Mutants to Study <i>S. mutans</i> Pathogenicity		
01	Aug. 1, 1982-Jul. 31, 1983	\$143,616
Cystic Fibrosis Foundation - Cystic Fibrosis Research Development Grant for CF Research Center		
01	Oct. 1, 1982-Sep. 30, 1983	\$300,000
02	Oct. 1, 1983-Sep. 30, 1984	300,000
03	Oct. 1, 1984-Sep. 30, 1985	300,000
04	Oct. 1, 1985-Sep. 30, 1986	300,000
05	Oct. 1, 1986-Sep. 30, 1987	300,000
<u>PAST SUPPORT</u> WASHINGTON UNIVERSITY (Only Direct Costs Listed):		
NIH R37 DE06673 - Genetic and Biochemical Bases for <i>S. mutans</i> Virulence		
01	Aug. 1, 1983-Jul. 31, 1984	\$97,279
02	Aug. 1, 1984-Jul. 31, 1985	103,840
03	Aug. 1, 1985-Jul. 31, 1986	111,274
04	Aug. 1, 1986-Jul. 31, 1987	109,226
05	Aug. 1, 1987-Jul. 31, 1988	126,911
06	Aug. 1, 1988-Jul. 31, 1989	138,203
07	Aug. 1, 1989-Jul. 31, 1990	119,556
08	Aug. 1, 1990-Jul. 31, 1991	117,321
09	Aug. 1, 1991-Jul. 31, 1992	121,179
10	Aug. 1, 1992-Jul. 31, 1993	125,922
11	Aug. 1, 1993-Jul. 31, 1994	134,000
12	Aug. 1, 1994-Jul. 31, 1995	146,649
13	Aug. 1, 1995-Jul. 31, 1996	143,338
14	Aug. 1, 1996-Jul. 31, 1997	148,286
15	Aug. 1, 1997-Jul. 31, 1998	153,433
WHO ID #830 249 - Genetic Analysis of <i>Mycobacterium leprae</i>		
	Jul. 1, 1983-Jul. 31, 1984	\$36,811
	Aug. 1, 1984-Jul. 31, 1985	39,500
WHO ID #830 100 - Genetic Analysis of <i>Mycobacterium leprae</i>		
	Jul. 1, 1983-Jun. 30, 1984	\$36,811
	Jul. 1, 1984-Jun. 30, 1985	43,289
	Sep. 1, 1985-Aug. 31, 1986	20,230
Molecular Engineering Associates, Inc. - Construction of Avirulent Mutants of Gram-negative Enteric Pathogens		
01	Aug. 1, 1983-Jul. 31, 1984	\$67,175
02	Aug. 1, 1984-Jul. 31, 1985	98,083
03	Nov. 1, 1985-Oct. 31, 1986	88,733
04	Nov. 1, 1986-Aug. 31, 1987	34,841
NIH R01 DE06801 - Use of Mutants to Study <i>S. mutans</i> Pathogenicity		
01	Aug. 1, 1983-Jul. 31, 1984	\$140,803

02	Aug. 1, 1984-Jul. 31, 1985	147,056
03	Aug. 1, 1985-Jul. 31, 1986	159,100
04	Aug. 1, 1986-Jul. 31, 1987	141,159
05	Aug. 1, 1987-Jul. 31, 1988	147,725
06	Aug. 1, 1988-Jul. 31, 1989	153,704
07	Aug. 1, 1989-Jul. 31, 1990	155,528

Procter and Gamble - Enhancement of the Secretory Immune System

01	Apr. 1, 1984-Mar. 31, 1985	\$89,903
02	Apr. 1, 1985-Mar. 31, 1986	65,555
03	Apr. 1, 1986-Mar. 31, 1987	67,319
04	Apr. 1, 1987-Mar. 31, 1988	70,733
05	Apr. 1, 1988-Mar. 31, 1989	78,769

NSF PCM 83-16440 - Spectrophotometer Facility for Genetic Research

01	Aug. 1, 1984-Jul. 31, 1985	\$32,000
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NIH R01 AI21548 - Protective Immunity to Pneumococcal Surface Proteins
(subcontract from UAB; Co-PI with David Briles)

01	Aug. 1, 1984-Jul. 31, 1985	\$32,065
02	Aug. 1, 1985-Jul. 31, 1986	35,945
03	Aug. 1, 1986-Jul. 31, 1987	33,307

NIH S10 RR 02424 - Fermentation Equipment

01	Dec. 1, 1984-Nov. 30, 1986	\$87,065
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USDA 86-CRSR-2-2854 - Genetic Analysis of Virulence of Avian Respiratory Bacterial Pathogens

	Sep. 1, 1986-Aug. 31, 1987	\$30,810
	Sep. 1, 1987-Aug. 31, 1988	28,793

Sungene Technologies - Plant Biotechnology Collaborative Research

01	Feb. 16, 1987-Feb. 15, 1988	\$35,762
02	Feb. 16, 1988-Feb. 15, 1989	33,962
03	Feb. 16, 1989-Aug. 15, 1989	18,801

NIH R22 AI26186 - Induction of Immunity to *Mycobacterium leprae* (Co-PI)

01	Apr. 1, 1988-Mar. 31, 1989	\$83,444
02	Apr. 1, 1989-Mar. 31, 1990	74,508
03	Apr. 1, 1990-Mar. 31, 1991	88,898

NIH S10 RR04117-01 - Instrumentation for An Integrated DNA Chemistry Facility

01	Apr. 11, 1988-Apr. 10, 1991	\$147,000
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Markey Center Support for an Integrated DNA Chemistry Core Facility

	Jun. 1, 1988-May 31, 1990	\$25,000
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NSF BSR-8817467 - Workshop on Computerization of Data Bases for Genetic Stock Collections; Toronto, Canada

01	Aug. 1, 1988-Jan. 31, 1989	\$15,169
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NSF DIR-8714254 - Facilities Center for Resource Biotechnology

01	Aug. 15, 1988-Jan. 31, 1991	\$460,000
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USDA 88-34116-3792 - *Salmonella* Infection, Persistence and Prevention

	Sep. 1, 1988-Aug. 31, 1989	\$24,587
	Sep. 1, 1989-Aug. 31, 1990	25,571

Center for Plant Science and Biotechnology - Genetically Modified Plants for Use as Oral Immunogens

	Jan. 1, 1989-Jun. 30, 1989	\$14,306
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	Jul. 1, 1989-Jun. 30, 1990	28,110
	Jul. 1, 1990-Jun. 30, 1991	28,400
	Jul. 1, 1991-Jun. 30, 1992	42,201
	Jul. 1, 1992-Jun. 30, 1993	33,592
	Jul. 1, 1993-Jun. 30, 1994	57,007
Agrigenetics - Plant Biotechnology Collaborative Research		
01	Aug. 16, 1989-Feb. 15, 1990	\$18,801
02	Feb. 16, 1990-Feb. 15, 1991	40,884
CONRAD CSA-90-071 - Development of Recombinant Avirulent <i>Salmonella</i> Antifertility Vaccines		
01	Feb. 1, 1990-Jan. 31, 1991	\$13,636
02	Feb. 1, 1991-Jan. 31, 1992	85,150
03	Feb. 1, 1992-Jan. 31, 1993	90,258
CONRAD CSA-94-129 - Development of Recombinant Avirulent <i>Salmonella</i> Antifertility Vaccines		
01	Dec. 1, 1993-Nov. 30, 1994	\$89,619
02	Dec. 1, 1994-Feb. 29, 1996	96,288
NIH R01 AI28487 - Genetic Analysis of <i>Bordetella avium</i> Virulence		
01	Apr. 1, 1990-Mar. 31, 1991	\$117,172
02	Apr. 1, 1991-Mar. 31, 1992	114,299
03	Apr. 1, 1992-Mar. 31, 1993	118,870
04	Apr. 1, 1993-Mar. 31, 1994	123,625
NIH 1S15 GM45467 - Small Instrumentation Grant		
01	Jun. 1, 1990-May 31, 1991	\$39,729
USDA GAM 9001702 - Analysis of <i>Salmonella enteritidis</i> Virulence in Chickens		
	Sep. 1, 1990-Aug. 31, 1991	\$77,936
	Sep. 1, 1991-Aug. 31, 1992	82,064
	Sep. 1, 1992-Aug. 31, 1993	91,617
	Sep. 1, 1993-Aug. 31, 1994	101,366
Bristol-Myers Squibb - Infectious Disease Research		
01	Apr. 1, 1991-Mar. 31, 1992	\$100,000
02	Apr. 1, 1992-Mar. 31, 1993	\$100,000
03	Apr. 1, 1993-Mar. 31, 1994	\$100,000
04	Apr. 1, 1994-Mar. 31, 1995	\$100,000
05	Apr. 1, 1995-Mar. 31, 1996	\$100,000
USDA 9102452 - Molecular Genetic Analysis of <i>Salmonella choleraesuis</i> Pathogenesis		
	Sep. 1, 1991-Aug. 31, 1992	\$77,150
	Sep. 1, 1992-Aug. 31, 1993	81,779
	Sep. 1, 1993-Aug. 31, 1994	86,685
NIH U54 HD29099 - Avirulent <i>Salmonella</i> SP10 Vaccine for Secretory Immunity		
01	Sep. 30, 1991-Sep. 29, 1992	\$ 72,899
02	Sep. 30, 1992-Sep. 29, 1993	73,784
NIH U54 HD29099 - Oral Recombinant <i>Salmonella</i> Antifertility Vaccines Core		
03	Sep. 1, 1993-Aug. 31, 1994	\$119,673
04	Sep. 1, 1994-Aug. 31, 1995	119,673
05	Sep. 1, 1995-Aug. 31, 1996	66,956
05A	Sep. 1, 1996-Feb. 28, 1997	47,256
Rockefeller Foundation Biotechnology Career Fellowship - Construction of a Recombinant Vaccine Strain of <i>Salmonella</i> Expressing Immunogenic and Protective Surface Antigen		

May 1, 1994-Apr. 30, 1997	\$59,900
NSF BIR-9317842 - Instrumentation for Computer-Based Detection and Imaging of Biological Samples	
May 1, 1994-Oct. 31, 1996	\$56,673
USDA 94-02102-1091 - Genetic Analysis of Avian <i>E. coli</i> Virulence	
Sep. 1, 1994-Aug. 31, 1995	\$51,348
Sep. 1, 1995-Mar. 31, 1997	53,915
Sep. 15, 1997-Sep. 30, 1998	73,960
Oct. 1, 1998-Sep. 30, 1999	77,400
Oct. 1, 1999-Sep. 30, 2000	80,840
NIH R41 AI36585 - Avirulent <i>Salmonella</i> Host-Vector Human Vaccine Systems	
01 Sep. 1, 1994-Nov. 30, 1995	\$ 76,779
02 May 1, 1997-Apr. 30, 1998	247,014
03 May 1, 1998-Apr. 30, 1999	250,952
USDA 97-35204-4512 - Genetic Analysis of Avian <i>E. coli</i> Virulence	
04 Sep. 15, 1997-Sep. 30, 1998	\$73,960
05 Oct. 1, 1998-Sep. 30, 1999	77,400
06 Oct. 1, 1999-Sep. 30, 2000	80,840
VION Pharmaceuticals, Inc. - Collaborative Research Endeavor	
Jul. 1, 1997-Jun. 30, 1998	\$50,000
USDA 97-02552 - Adhesins for Colonization of Chickens & Their Use in Prevention of Salmonellosis	
01 Oct. 1, 1997-Sep. 30, 1998	\$43,000
02 Oct. 1, 1998-Sep. 30, 1999	44,720
03 Oct. 1, 1999-Sep. 30, 2000	46,400
STTR IR41-AI38599 - Biological Containment of Live Bacterial Vaccines	
01 Sep. 1, 1995-Aug. 31, 1996	\$ 68,838
02 Sep. 15, 1999-Aug. 31, 2000	146,064
03 Sep. 1, 2000-Aug. 31, 2001	147,617
USDA 99-35204-8572 - Attenuated <i>Salmonella</i> Antigen and DNA Vaccine Delivery Vaccines Against <i>Eimeria</i>	
Sep. 1, 1999-Aug. 31, 2000	\$76,611
Sep. 1, 2000-Aug. 31, 2002	91,062
USDA 00-35204-9224 - Genetic Analysis of Avian <i>E. coli</i> Virulence	
07 Sep. 1, 2000-Aug. 31, 2001	\$73,056
08 Sep. 1, 2001-Aug. 31, 2002	76,100
09 Sep. 1, 2002-Aug. 31, 2003	79,144
USDA 2001-02994 - Induction of Cross Protective Immunity to <i>Salmonella</i> in Chickens	
01 Oct. 1, 2001-Sep. 30, 2002	\$79,326
02 Oct. 1, 2002-Sep. 30, 2003	82,790
03 Oct. 1, 2003-Jun. 15, 2004	
NIH R01 DE06669 - Antigen Delivery System Design for Host Defense Analysis	
01 Apr. 1, 1983-Mar. 31, 1984	\$189,524
02 Apr. 1, 1984-Mar. 31, 1985	160,545
03 Apr. 1, 1985-Mar. 31, 1986	203,903
04 Apr. 1, 1986-Mar. 31, 1988	210,309
05 Apr. 1, 1988-Mar. 31, 1989	117,048
06 Apr. 1, 1989-Mar. 31, 1990	105,248
07 Apr. 1, 1990-Mar. 31, 1991	104,004
08 Mar. 1, 1992-Feb. 28, 1993	140,000

09	Mar. 1, 1993-Feb. 28, 1994	135,281
10	Mar. 1, 1994-Feb. 28, 1995	141,237
11	Mar. 1, 1995-Feb. 29, 1996	146,885
12	Mar. 1, 1996-Feb. 28, 1997	152,724
13	May 1, 2000-Apr. 30, 2001	212,500
14	May 1, 2001-Apr. 30, 2002	212,500
15	May 1, 2002-Apr. 30, 2003	212,500
16	May 1, 2003-Apr. 30, 2004	212,500
17	May 1, 2004-Apr. 30, 2005	212,500

PAST SUPPORT—Washington University and Arizona State University (Only Direct Costs Listed)

USDA 03-35204-13748 - Attenuated *Salmonella* Antigen and DNA Vaccine Delivery Vaccines Against *Eimeria*
Aug. 1, 2003-Jul. 31, 2006 \$218,800

NIH R01 AI24533 - Molecular Genetic Analysis of *Salmonella* Pathogenicity

01	Apr. 1, 1987-Mar. 31, 1988	\$74,189
02	Apr. 1, 1988-Mar. 31, 1989	65,526
03	Apr. 1, 1989-Mar. 31, 1990	65,865
04	Apr. 1, 1990-Mar. 31, 1991	181,148
05	Apr. 1, 1991-Mar. 31, 1992	191,531
06	Apr. 1, 1992-Mar. 31, 1993	161,563
07	Apr. 1, 1993-Mar. 31, 1994	162,336
08	Apr. 1, 1994-Mar. 31, 1995	163,071
09	Sep. 1, 1996-Mar. 31, 1997	179,378
09	Apr. 1, 1997-Mar. 31, 1998	61,530
10	Apr. 1, 1998-Mar. 31, 1999	159,330
11	Apr. 1, 1999-Mar. 31, 2000	164,110
12	Apr. 1, 2000-Mar. 31, 2001	169,033
13	Jun. 15, 2002-May 31, 2003	250,000
14	Jun. 1, 2003-May 31, 2004	225,000
15	Jun. 1, 2004-May 31, 2005	225,000
16	Jun. 1, 2005-May 31, 2006	225,000
17	Jun. 1, 2006-May 31, 2007	225,000

Ellison Medical Foundation ID-SS-0520-03 – Providing an economic benefit to using a vaccine to enhance food safety and to reduce antibiotic use in agriculture

01	Sept. 1, 2003-Oct. 31, 2004	\$149,976
02	Nov. 1, 2004-Oct. 31, 2005	149,976
03	Nov. 1, 2005-Oct. 31, 2006	149,976
04	Nov. 1, 2006-Oct. 31, 2007	149,976

AERAS Collaborative Research Proposal

01	Feb 1, 2008-Jan. 31, 2009	\$167,205
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NIH R01 AI065779 – *Salmonella* Anti-Influenza DNA and Antigen Delivery Vaccine

01	Aug. 16, 2005-Jan. 31, 2006	\$201,616
02	Feb. 1, 2006-Jan. 31, 2007	486,055
03	Feb. 1, 2007-Jan. 31, 2008	494,119
04	Feb. 1, 2008-Jan. 31, 2009	467,762
05	Feb. 1, 2008-Jan. 31, 2010	no-cost extension

USDA 2007-35201-18519

Food Safety Vaccine of Economic Benefit to Poultry Producers to Prevent *Salmonella* and APEC Infections and Foodborne Transmission to Humans

01	Aug. 15, 2007-Aug. 14, 2008	\$103,248
02	Aug. 15, 2008-Aug. 14, 2009	106,612
03	Aug. 15, 2009-Aug. 14, 2010	110,090

04 Aug. 15, 2010-Aug. 14, 2011 no-cost extension

US Department of Energy ARPA-E – Cyanobacteria designed for solar-powered highly efficient production of biofuels
(Willem Vermaas, PI; Roy Curtiss, Co-PI)

01 Jan. 1, 2010-Dec. 31, 2010 \$418,909
02 Jan. 1, 2011-Dec. 31, 2011 411,353

Bill and Melinda Gates Fdn 37863 – A Live Recombinant Attenuated *Salmonella* Anti-Pneumococcal Vaccine for Newborns

01 Jul. 1, 2005-Jun. 30, 2006 \$1,108,518
02 Jul. 1, 2006-Jun. 30, 2007 1,347,594
03 Jul. 1, 2007-Jun. 30, 2008 2,740,951
04 Jul. 1, 2008-Jun. 30, 2009 4,341,943
05 Jul. 1, 2009-Jun. 30, 2010 3,294,722
06 Jul. 1, 2010-Jun. 30, 2011 no-cost extension
07 Jul. 1, 2011-July 31, 2012 no-cost extension

Bill and Melinda Gates Fdn Supplemental Funding – A Live Recombinant Attenuated *Salmonella* Anti-Pneumococcal Vaccine for Newborns

Jul. 25, 2007-Jun. 30, 2010 \$630,706
Jul. 1, 2010-July 31, 2012 no-cost extension

NIH R21 CA152456 - Engineered Self-destructing *Salmonella* as a Colorectal Cancer Cure
(Wei Kong, PI; Roy Curtiss, Co-Investigator)

01 Jun. 1, 2010-May 31, 2011 \$108,750
02 Jun. 1, 2011-May 31, 2012 126,585
03 Jun. 1, 2012-May 31, 2013 no-cost extension

USDA 2009-65119-05703 – Bath/Oral Live Recombinant *Edwardsiella* Vaccine for the Aquaculture Industry

01 Sept. 1, 2009-Aug. 31, 2010 \$105,733
02 Sept 1, 2010-Aug. 31, 2011 98,121
03 Sept 1, 2011-Aug. 31, 2012 101,064
04 Sept 1, 2012-Aug. 31, 2013 no-cost extension

CURRENT SUPPORT (Only Direct Costs Listed):

NIH R01 AI056289 – Recombinant Attenuated *Salmonella* Vaccines for Humans

01 Jul. 1, 2003-Dec. 31, 2003 \$149,337
02 Jan. 1, 2004-Dec. 31, 2004 250,000
03 Jan. 1, 2005-Dec. 31, 2005 250,000
04 Jan. 1, 2006-Dec. 31, 2006 250,000
05 Jan. 1, 2007-Dec. 31, 2007 250,000
06 Jan. 1, 2007-Dec. 31, 2007 250,000
07 Jun. 1, 2008-May 31, 2009 250,000
08 Jun. 1, 2009-May 31, 2010 250,000
09 Jun. 1, 2010-May 31, 2011 250,000
10 Jun. 1, 2011-May 31, 2012 245,025
11 Jun. 1, 2012-May 31, 2013 245,025
12 Jun. 1, 2013-May 31, 2014 no-cost extension

NIH U01 AI60557 - *S. typhimurium* Vaccine Against Bacterial Enteropathogens

01 Sept. 30, 2003-March 31, 2004 \$152,254
02 April 1, 2004-Mar. 31, 2005 200,918
03 April 1, 2005-Mar. 31, 2006 206,327
04 April 1, 2006-Mar. 31, 2007 211,898
05 April 1, 2007-Mar. 31, 2008 217,636
06 April 1, 2008-Mar. 31, 2009 no-cost extension
07 Feb. 4, 2010-Jan. 31, 2011 340,055
08 Feb. 1, 2011-Jan. 31, 2012 286,743

09	Feb. 1, 2012-Jan. 31, 2013	292,454
10	Feb. 1, 2013-Jan. 31, 2014	298,315
11	Feb. 1, 2014-Jan. 31, 2015	304,262

NIH R01 AI057885 – Attenuated Live and Recombinant *Yersinia pestis* Vaccines

01	Jan. 1, 2004-Dec. 31, 2004	\$437,263
02	Jan. 1, 2005-Dec. 31, 2005	398,601
03	Jan. 1, 2006-Dec. 31, 2006	409,922
04	Jan. 1, 2007-Dec. 31, 2007	421,582
05	Jan. 1, 2008-Dec. 31, 2008	463,961
06	Jan. 1, 2009-Dec. 31, 2009	no-cost extension
07	Jun. 1, 2010-May 31, 2011	250,000
08	Jun. 1, 2011-May 31, 2012	250,000
09	Jun. 1, 2012-May 31, 2013	250,000
10	Jun. 1, 2013-May 31, 2014	232,650
11	Jun. 1, 2014-May 31, 2015	247,500

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Advancing the understanding of the zoonotic risk of ExPECs and evaluation of a vaccine to control these contaminants in poultry production

01	Mar. 15, 2011-Mar. 14, 2012	\$233,615
02	Mar. 15, 2012-Mar. 14, 2013	233,499
03	Mar. 15, 2012-Mar. 14, 2014	233,359
04	Mar. 15, 2014-Mar. 14, 2015	226,969
05	Mar. 15, 2015-Mar. 14, 2016	233,778

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01	May 1, 2011-Apr. 30, 2012	\$673,374
02	May 1, 2012-Apr. 30, 2013	672,580
03	May 1, 2013-Apr. 30, 2014	605,322
04	May 1, 2014-Apr. 30, 2015	605,322
05	May 1, 2015-Apr. 30, 2016	605,322

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(Kenneth Roland, PI; Roy Curtiss, Co-Investigator)

01	Apr. 15, 2010-Mar. 31, 2011	\$139,417
02	Apr. 1, 2011-Mar. 31, 2012	133,401
03	Apr. 1, 2012-Mar. 31, 2013	147,104
04	Apr. 1, 2013-Mar. 31, 2014	no-cost extension