

**BIOGRAPHICAL SKETCH**

Provide the following information for the Senior/key personnel and other significant contributors.  
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NAME: Skinner, Michael K.

eRA COMMONS USER NAME (credential, e.g., agency login): skinner

POSITION TITLE: Professor

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Warner Pacific College, Portland, OR	A.S.	06/77	General Science
Reed College, Portland, OR	B.A.	06/79	Chemistry
Washington State University, Pullman, WA	Ph.D.	06/82	Biochemistry
University of Toronto, Toronto, Ont., Canada	Post-doc	1984	Biochem/Physiol.
Rosetta Inpharmatics/Merck, Seattle WA	Sabbatical	2008	Bioinformatics

**A. Personal Statement.** The Skinner laboratory has operated for over 25 years with over 25 years of research in gonadal development and cell biology and 15 years in epigenetics research. The ability of environmental factors to promote an epigenetic transgenerational inheritance of adult onset disease phenotypes was first described by the Skinner laboratory. More recently many of the current state of the art epigenetic technologies have been in part developed and utilized by the Skinner laboratory. Therefore, Dr. Skinner and his laboratory are well qualified to perform the proposed research. Dr. Michael Skinner has trained over 56 students and fellows and published over 296 publications.

Jirtle RL and MK Skinner (2007) Environmental Epigenomics and Disease Susceptibility. *Nature Genetics Rev.* 8:253-262. PMID: 16973726

Skinner MK (2014) A new kind of inheritance. *Scientific American* 311(2)44-41. PMID: 25095468

Skinner MK (2014) Endocrine disruptor induction of epigenetic transgenerational inheritance of disease. *Molecular and Cellular Endocrinology.* Vol. 398, Pages 4-12. PMID: 25088466

Hanson MA, Skinner MK. (2016) Developmental origins of epigenetic transgenerational inheritance. *Environ Epigenet.* 2016;2(1). PMID: 27390622

**B. Positions and Honors.****Positions:**

2010-Present Professor, School of Biological Sciences, Washington State University, Pullman, Washington.

2002-2008 Founder and Director, Center for Integrated Biotechnology, Washington State University, Pullman, Washington.

1996-2008 Founder and Director, Center for Reproductive Biology, Washington State University, Pullman, Washington.

1996-2010 Professor, School of Molecular Biosciences, Washington State University, Pullman, Washington.

1991-1996 Member, the Reproductive Endocrinology Center and the Developmental Biology Program in Biological Sciences, University of California, San Francisco.

1991-1996 Associate Professor, Department of Obstetrics, Gynecology and Reproductive Sciences and Department of Physiology, University of California, San Francisco, CA.

1985-1991 Assistant Professor, Department of Pharmacology, Vanderbilt University, School of Medicine, Nashville, Tennessee.

### **Honors: (Selected Past 5 Years)**

- 2016 Invited by Elsevier Press to develop and act as the Editor-in-Chief of the Encyclopedia of Reproduction, Second Edition, involving 6 volumes and over 600 chapters to be published in 2018.
- 2016 Washington State University Distinguished Faculty Address and Outstanding Career Achievement Award
- 2015 Invited by Oxford University Press to establish the journal Environmental Epigenetics and act as the Founding Editor-in-Chief.
- 2014 Invited TEDxRainier Talk, Seattle, WA, (One of the largest worldwide)  
<https://www.youtube.com/watch?v=f1Pf5S8Nbfk>
- 2014 Awarded Eastlick Distinguished Professorship
- 2014 Invited Featured article in Scientific American, "A New Kind of Inheritance".
- 2013 Awarded Smithsonian 2013 "American Ingenuity Award", in the area of the Natural Sciences, Washington, D.C. With feature article in Smithsonian Magazine and documentary on the Smithsonian Channel.
- 2013 Fifth Annual Gregor Stoddard Visiting Professorship and Lecturer, Department of Pediatrics, University of Colorado, School of Medicine, Aurora, CO.
- 2012 Elected Fellow of the American Association for the Advancement of Science (AAAS).
- 2012 Brasel Basic Science Lectureship, Los Angeles, Biomedical Research Institute at Harbor-UCLA, Los Angeles, CA.
- 2012 The DH Ruttenberg Visiting Professorship in Endocrine Disruption and Child Health, Mt. Sinai School of Medicine. New York, NY.
- 2010 Newsweek Magazine, Science Feature, "Sins of the Grandfathers", November 8, 2010.

### **C. Contributions to Science.**

#### **Selected peer-reviewed publications relevant to application (Selected from over 275 publications):**

<http://www.ncbi.nlm.nih.gov/sites/myncbi/1PiX8IHGveyAh/bibliography/41624451/public/?sort=date&direction=ascending>.

(1) Anway M, Cupp AS, Uzumcu M and MK Skinner (2005) Epigenetic transgenerational actions of endocrine disruptors and male fertility. *Science* 308:1466-1469. PMID: 15933200

Senior author that designed and oversaw the research. This is the first example of an environmentally induced epigenetic transgenerational inheritance of disease. The first model of non-genetic inheritance with an epigenetic mechanism documented. The most highly cited research manuscript in the reproductive sciences. The extensive press can be seen at <http://skinner.wsu.edu/pressinfo.html>

Skinner MK (2008) What is an epigenetic transgenerational phenotype? F3 or F2. *Reproductive Toxicology*. 25:2-6. PMID: 17949945

Skinner MK, Guerrero-Bosagna C, Haque MM. (2015) Environmentally induced epigenetic transgenerational inheritance of sperm epimutations promote genetic mutations. *Epigenetics*. 10(8):762-71. PMID: 26237076

McBirney M, King SE, Pappalardo M, Houser E, Unkefer M, Nilsson E, Sadler-Riggelman I, Beck D, Winchester P, Skinner MK. (2017) Atrazine induced epigenetic transgenerational inheritance of disease, lean phenotype and sperm epimutation pathology biomarkers. *PLoS One*. 12(9):e0184306. PMID: 28931070

(2) Mohan Manikkam, Carlos Guerrero-Bosagna, Rebecca Tracey, Md. M. Haque and Michael K. Skinner (2012) Transgenerational Actions of Environmental Compounds on Reproductive Disease and Identification of Epigenetic Biomarkers of Ancestral Exposures. *PLoS ONE* 7(2):e31901. PMID: 22389676

Senior author and designed the experiments. This is the first report of exposure specific epimutations in the germline suggesting epigenetics can provide diagnostic markers for exposures and later life disease. The first genome-wide analysis of transgenerational germline epimutations. One of the most highly accessed papers in the field. The extensive press can be seen at <http://skinner.wsu.edu/toxnews/projectnews.html>

Nilsson E, Larsen G, Manikkam M, Guerrero-Bosagna C, Savenkova MI, Skinner MK. (2012) Environmentally induced epigenetic transgenerational inheritance of ovarian disease. PLoS ONE. 7(5):e36129. PMID: 22570695

Skinner MK, Manikkam M, Haque Md., Zhang B, Savenkova M (2012) Epigenetic Transgenerational Inheritance of Somatic Transcriptomes and Epigenetic Control Regions. Genome Biology 3;13(10):R91. PMID: 23034163

Guerrero-Bosagna C, Savenkova M, Haque Md. M, Sadler-Riggleman I, and Skinner MK (2013) Environmentally Induced Epigenetic Transgenerational Inheritance of Altered Sertoli Cell Transcriptome and Epigenome: Molecular Etiology of Male Infertility. PLoS ONE 8(3): e59922. PMID: 23555832

**(3)** Skinner MK, Manikkam M, Tracey R, Nilsson E, Haque Md. M, and Guerrero-Bosagna C (2013) Ancestral DDT Exposure Promotes Epigenetic Transgenerational Inheritance of Obesity. BMC Medicine 11:228. PMID: 24228800

This was one of the first reports of environmental toxicant promoting transgenerational obesity. The germline epimutations were also identified in this paper. One of the highly accessed papers of BMC Medicine. Press on the paper can be seen at <http://skinner.wsu.edu/toxnews/projectnews.html>

Skinner MK and Guerrero-Bosagna C (2014) Role of CpG Deserts in the Epigenetic Transgenerational Inheritance of Differential DNA Methylation Regions. BMC Genomics 15:692. PMID: 25142051

Haque M, Holder, LB, Skinner MK (2015) Genome-Wide Locations of Potential Epimutations Associated with Environmentally Induced Epigenetic Transgenerational Inheritance of Disease Using a Novel Machine Learning Prediction Approach. Plos One 10(11):e0142274. PMID: 26571271

Nilsson EE and Skinner MK (2015) Environmentally Induced Epigenetic Transgenerational Inheritance of Reproductive Disease. Biology of Reproduction 93(6):145, 1-8. PMID: 26510870

**(4)** Skinner MK, Guerrero-Bosagna C, Haque M, Knutie S, Koop J, and Clayton D (2014) Epigenetics and the Speciation and Evolution of Darwin's Finches. Genome Biology & Evolution 24;6(8):1972-89. PMID: 25062919

First author and designed experiments and wrote the manuscript. Provides the first phenotypic associations between related species to suggest a potential role of epigenetics in evolutionary biology. One of the most highly accessed papers for this journal. Press can be seen at <http://skinner.wsu.edu/toxnews/projectnews.html>

Guerrero-Bosagna C, Skinner MK. (2014) Environmentally induced epigenetic transgenerational inheritance of male infertility. Curr Opin Genet Dev. 4;26C:79-88. PMID: 25104619

Skinner MK (2015) Environmental Epigenetics and a Unified Theory of the Molecular Aspects of Evolution: A Neo-Lamarckian Concept that Facilitates Neo-Darwinian Evolution. Genome Biol Evol 7(5): 1296-1302. PMID: 25917417

McNew SM, Beck D, Sadler-Riggleman I, Knutie SA, Koop JAH, Clayton DH, Skinner MK. (2017) Epigenetic variation between urban and rural populations of Darwin's finches. BMC Evol Biol. 17(1):183. PMID: 28835203

**(5)** Skinner MK, Savenkova M, Zhang B, Gore A, and Crews D (2014) Gene Bionetworks Involved in Epigenetic Transgenerational Inheritance of Altered Mate Preference: Environmental Epigenetics and Evolutionary Biology. BMC Genomics 16;15(1):337. PMID: 24885959

First author and designed the research and wrote the paper. The first system biology analyses of mate preference and associated epigenetic transgenerational inheritance of brain function. One of the first transcriptome links to behavioral outcome. Highly accessed paper in field. Press can be seen at <http://skinner.wsu.edu/pressinfo.html>

Manikkam M, Haque M, Guerrero-Bosagna C, Nilsson EE, Skinner MK (2014) Pesticide methoxychlor promotes the epigenetic transgenerational inheritance of adult onset disease and sperm epimutations through the female germline. PLoS ONE 9(7):e102091. PMID: 25057798

Schuster A, Skinner MK, Yan W. (2016) Ancestral vinclozolin exposure alters the epigenetic transgenerational inheritance of sperm small noncoding RNAs. Environ Epigenet. 2(1). pii: dvw001. PMID: 27390623

Shnorhavorian M, Schwartz SM, Stansfeld B, Sadler-Riggleman I, Beck D, Skinner MK. (2017) Differential DNA Methylation Regions in Adult Human Sperm following Adolescent Chemotherapy: Potential for Epigenetic Inheritance. PLoS One 12(2):e0170085. PMID: 28146567

#### **D. Research Support.**

##### Active

NIH R01 ES012974-11, 4/1/2014-3/31/2019, "Epigenetic Transgenerational Endocrine Disruptor Actions" This project deals with the examination of the epigenetic actions of the endocrine disruptor vinclozolin on testis development and male fertility. This grant investigates the DNA methylation mechanisms involved in the transgenerational phenomena. Principal Investigator: Dr. Michael K. Skinner.

NIH 5R01CA175216 4/1/2018-3/31/2023 "Testicular effects of modern chemotherapy regimens in osteosarcoma survivors" Co-Investigator: Dr. Michael K. Skinner.

##### Pending

NIH R01ES029473, 07/01/2018-06/30/2023, "Preconception Exposures and Epigenetic Inheritance" Principal Investigator: Michael K. Skinner.