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Michael W. Killen

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PERSONAL STATEMENT

I currently serve as a fauclty member in the department of biology at Western Kentucky University. I enjoy the challenging work environment and allow me to apply the skill sets and toolbox I have acquired over my career as a scientist and communicator. As an instructor at Western Kentucky University and University of Kentucky I have taught a multitude of major's and non-major's, undergraduate and graduate biology and chemistry classes for both very large and small classes both in person and online. This experience has shaped my ability to communicate complex scientific concepts to students and lay people and I believe it has furthered my grasp of basic science and how it can be applied in fundamental everyday scenarios as well as complicated scientific challenges. In addition, I hold a Ph.D. in Microbiology, Immunology, and Molecular Genetics from the University of Kentucky, College of Medicine along with a M.S. in Medical Science. My doctoral research was conducted in the field of human molecular genetics. Prior to starting my dissertation research, I completed three separate Bachelor of Science degrees in Biology, Chemistry and Mathematics at the University of Kentucky that included a significate amount of course work in Physics. During this time, I acquired a myriad of laboratory experience ranging from organic synthesis labs and instrumentation to medical research and genetic engineering. I have also acquired extensive experience in managing scientific laboratories with technicians and students participating in independent research.

EDUCATION

2006-2011 Microbiology, Immunology, and Molecular Genetics **Ph.D**., University of Kentucky College of Medicine
2006-2008 Medical Sciences **M.S**, University of Kentucky College of Medicine
1997-2004 Biology **B.S**., University of Kentucky
1997-2004 Chemistry **B.S**., University of Kentucky
1997-2004 Mathematics **B.S**., University of Kentucky

EMPLOYMENT SUMMARY

2013-current **Instructor**, Western Kentucky University, Department of Biology
2012-2013 **Instructor**, Western Kentucky University, Department of Biology and Department of Chemistry and the Honors College.
2011-current **Owner/manager** Rare Lotus Properties, LLC.
2006-2011 **Pre-doctoral Fellow**, Andrew J. Pierce advisor. University of Kentucky Department of Microbiology, Immunology, and Molecular Genetics
2004-2006 **Instructor,** Kaplan Test Prep Center. Lexington and Louisville Kentucky.
2003-2006 **Lab Manager,** Craig Miller advisor. University of Kentucky Department of Microbiology, Immunology, and Molecular Genetics.
2002-2004 **Teaching Assistant**, University of Kentucky, Department of Chemistry.
2000-2001 **Lab Technician**, Stephen Testa advisor. University of Kentucky, Department of Chemistry.
1997-2000 **Lab Technician**, Mark P. Mattson advisor. University of Kentucky, Sanders-Brown Center on Aging.

PUBLICATIONS

1. **Killen, Michael & Stults, Dawn & Casanova, Marco & Pierce, Andrew. (2020).** The Gene Cluster Instability (GCI) Assay for Recombination. 10.1007/978-1-0716-0223-2_26.
2. **Stults, Dawn & Killen, Michael & Casanova, Marco & Pierce, Andrew. (2020).** The Sister Chromatid Exchange (SCE) Assay. 10.1007/978-1-0716-0223-2_25.

3. **Killen MW**, Stults DM, and Pierce AJ. *XRDRE: A New Reporter gene for Non-Allelic Homologous recombination.* (submitted)
4. **Killen MW**, Stults DM, and Pierce AJ. 2014. Molecular Toxicology Protocols. *The Gene Cluster Instability (GCI) Assay for Recombination.* Methods in Molecular Biology 1105: 457-79
5. **Killen MW**, Stults DM, Wilson WA and Pierce AJ. *Escherichia coli RecG functionally suppresses human Bloom syndrome phenotypes.* BMC Mol Biol. 2012 Oct 30;13:33
6. **Killen, Michael**. (2011) LOSS OF BLOOM SYNDROME PROTEIN CAUSES DESTABILIZATION OF GENOMIC ARCHITECTURE AND IS COMPLEMENTED BY ECTOPIC EXPRESSION OF Escherichia coli RecG IN HUMAN CELLS. [unpublised Ph.D. Dissertation] University of Kentucky.
7. **Killen MW,** Taylor TL, Stults DM, Jin W, Wang LL, Moscow JA, Pierce AJ**.** *Configuration and rearrangement of the human GAGE gene clusters.* Am J Transl Res. 2011 May 15;3(3):234-42.
8. **Killen MW**, Stults DM, Adachi N, Hanakahi L, Pierce AJ**.** *Loss of Bloom syndrome protein destabilizes human genomic architecture***.** Hum Mol Genet. 2009 Sep 15;18(18):3417-28.
9. Stults DM, **Killen MW**and Pierce AJ. 2014. Molecular Toxicology Protocols. *The sister chromatid exchange (SCE) assay*. Methods in Molecular Biology 1105: 439-55
10. Stults DM, **Killen MW,** Shelton BJ and Pierce AJ. *Recombination phenotypes of the NCI-60 collection of human cancer cells*. BMC Mol Biol. 2011 May 17;12:23
11. Singh TR, Saro D, Ali AM, Zheng XF, Du CH, **Killen MW**, Sachpatzidis A, Wahengbam K, Pierce AJ, Xiong Y, Sung P, Meetei AR *MHF1-MHF2, a histone-fold-containing protein complex, participates in the Fanconi anemia pathway via FANCM.* Mol Cell. 2010 Mar 26;37(6):879-86
12. Stults DM, **Killen MW**, Williamson EP, Hourigan JS, Vargas HD, Arnold SM, Moscow JA and Pierce AJ. *Human ribosomal RNA gene clusters are recombinational hotspots in cancer.* Cancer Res. 2009 Dec 1;69(23):9096-104.
13. Stults DM, **Killen MW**, Pierce HH, Pierce AJ. *Genomic architecture and inheritance of human ribosomal RNA gene clusters.* Genome Res. 2008 Jan;18(1):13-8.
14. Fu, W., **Killen, M. W**., Culmsee, C., Dhar, S. Pandita, T. K., and Mattson, M. P. *The Catalytic Subunit of Telomerase Is Expressed in Developing Brain Neurons and Serves a Cell Survival- Promoting Function.* J. Mol. Neurosci. 14, 3-15. (2000)
15. Fu, W., Begley, J. G., **Killen, M. W**., and Mattson, M. P. *Anti-apoptotic Role of Telomerase in Pheochromocytoma Cells.* J. Biol. Chem. 274, 7264-7271. (1999)

EMPLOYMENT HISTORY

2012-current ***Instructor**, Western Kentucky University Department of Biology.* As an instructor in the Department of Biology at Western Kentucky University for the past 8 years I have been charged with the development and presentation of curricula for the first-year general education introductory biology course and the corresponding lab, as well as the major's general biology course, Microbiology courses and Anatomy and Physiology classes geared toward students entering healthcare related fields. I have taught and was responsible for developing content for a graduate level ecological and evolutionary genetics as well as a graduate level biochemistry courses and Advanced Anatomy and Physiology curriculum. All material was presented in power point to allow the students electronic access that coincided with the blackboard learning environment. In addition, I have used multiple types of software to facilitate video recordings and to present live lectures online for web versions of these courses. In my first semester I developed an interactive online learning environment to help students study for exams, a tool that lead to marked improvement of exam scores as the semester progressed. More recently the department adopted an interactive platform from McGraw-Hill that integrates the material for the course into e-text with online study modules and interactive quizzes similar to my initial design. During the process of adopting the new e-text and learning environment I chaired a committee that was charged with reorganizing and selecting the core content of all the non-major introductory biology classes to homogenize the content that different instructors were presenting in class. I also participated in the committee that was given this same task for Microbiology and Anatomy and Physiology core content. At the start of the Covid-19 pandemic I took it upon myself to develop new and innovated methodologies to ensure that students could learn and most importantly be tested fairly and rigorously on challenging content that was detriment to their future careers in health care. I conducted various trials and implemented substantial statistical analysis to limit cheating and provide fair assessments in an online testing environment at virtually zero cost. These methodologies were shared with colleagues and have been implemented by other professors university wide. At Western Kentucky University I have been a lecturer in both large classes (300+ students) and small classrooms (25 students), I have taught classes online and some

hybrid classes that were mostly online but have regular meetings. I have also taught the corresponding laboratory courses for these courses. Aside from these responsibilities I have participated in student mentoring especially for students entering healthcare related fields along with helping them find shadowing and intern positions. I have helped fill in for several colleagues in a multitude of classes in situations whenever I was needed.

2012-2013 ***Instructor,*** *Western Kentucky University Department of Chemistry*. As an instructor in the Department of Chemistry at Western Kentucky University I was tasked with the development and presentation of curricula for the first-year introductory chemistry series Chemistry 105, 106, 107 and 108. Chemistry 105 focuses of introductory inorganic chemistry along with its corresponding lab 106. Chemistry 107 focuses on organic chemistry and biochemistry along with the corresponding lab class 108

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2006-2011 ***Pre-doctoral Fellow/Research Assistant****, University of Kentucky, Department of Microbiology, Immunology, and Molecular Genetics.* My time in the Pierce lab has been the most fruitful and edifying experience of my tenure at the University of Kentucky. While seeking my doctorate I have mastered a plethora of unique molecular techniques as well as conventional methodologies. I have become acutely aware of the attention to detail that is needed to conduct scientific research and I have acquired the ability to scrutinize the fine details of my experimental plans and use that knowledge to piece together data in order to answer larger questions. Additionally I have been involved in IRB protocol development for human subjects research and conducting human subjects research. The laboratory environment also allowed me to participate in collaborative studies with investigators at other universities across the US resulting in two publications. My work in the Pierce lab required extensive use of flow cytometry, pulse-field gel electrophoresis, southern analysis, and processing of human tissue and blood along with cultured mammalian cells for mega-base scale DNA extraction. Through the course of my investigations I also conducted sister-cromatid exchange assays, shRNA knock-down experiments and reporter gene development and implementation. The results of my work have contributed greatly to the development of a novel biomarker assay for measuring genomic instability as well as implementing this new assay to explore the genetic and mechanistic underpinnings of genomic stability. Further I have developed a new reporter gene to investigate three previously un-assayable classes of homologous recombination.

2003-2006 ***Lab Manager****, University of Kentucky University of KentuckyDepartment of Microbiology, Immunology, and Molecular Genetics.* While in Dr. Craig Miller's lab I was involved in every aspect of the laboratory environment. I was responsible for ordering and keeping stock of both general and specialized laboratory supplies. I managed and taught molecular techniques to over 8 undergraduates and 4 graduate students while in the lab. I was involved in the planning and execution of my own experiments under the guidance of Dr. Craig Miller, Dr. Robert Jacob, and Dr. Robert Danaher. Additionally, some of the labs research involved close interaction with other faculty members. The majority of the work involved Herpes Simplex Virus but also included some other transmissible diseases. I was involved in analysis of cellular gene products through microarray and employment of bioinformatic tools such as Vector NTI, blast, GeneBank, and many others to analyze, classify, and build correlations between viral growth and latency in a host based on the data. I assisted in the validation of the microarray with real time PCR. I was responsible for the maintenance of innumerous cell lines, including the development of neurally differentiated PC12 cultures for long term quiescent infection experiments. I grew and maintained and developed mutant and wild-type viral and adenoviral stocks. I was involved in the production, purification, and classification of new viral mutants. I produced and maintained numerous clonal cell lines. I was responsible for isolation and characterization of Protein and RNA gene products through western, luminescence, fluorescence and microscopy, real-time PCR and several other molecular techniques. During the course of my investigations I was involved in various experiments involving apoptosis as well as flow cytometry. Additionally, I gained proficiency in both fluorescence and confocal microscopy.

2004-2006 ***Instructor****, Kaplan Test Prep Center. Lexington and Louisville Kentucky*.
During my employment at Kaplan I prepared and presented lectures based around Kaplan's Test preparation methodologies for students taking the MCAT, DAT, PCAT, and GRE. These presentations have mostly included general chemistry and biology but varied some including organic chemistry and physics. The classes

varied in size and ranged from 5 to 30 students and met for three hours 2 nights a week over an 8 weeks period for 4 sessions in any year.

***2002-2004 Teaching Assistant**, University of Kentucky, Department of Chemistry*.
As a teaching assistant and in my experience in the chemistry program I was exposed to many other laboratory environments. I was responsible for the safety and maintenance of the graduate level chemistry class entitled CHE 533G-The Qualitative Spectroscopic Analysis of Organic Compounds. Outside of lab management I was also responsible for the instruction of the students on the use of and maintenance of equipment for Nuclear Magnetic Resonance, Mass Spectroscopy, IR Spectroscopy, UV-vis Spectroscopy, Gas Chromatography, and Chemical Separations to identify organic compounds. I also over saw organic synthesis projects and was responsible for the chemical hygiene of the class as well as the teaching responsibilities for concept development and weekly lectures. While employed in the chemistry department I also served as a teaching assistant for CHE 441G, CHE 233, and CHE 105. In this regard, my responsibilities in CHE 441G, entitled Physical Chemistry Laboratory, was to teach the students computing skills with the use of Gaussian software to determine quantum bonding properties as well as instruct the students in the experimental determination of the electrodynamic, thermodynamic, and vibrational bonding properties of chemical compounds. CHE 233 is Organic Lab II; this lab was modeled after CHE 533 but was for underclassmen. My responsibilities in CHE 105, General Chemistry I, were strictly in a lecturing capacity. I was responsible for the preparation of lecture material and presentation of that material to two different classes of approximately 20-30 students.

2000-2001 ***Lab Technician**, Stephen Testa advisor. University of Kentucky, Department of Chemistry.* During my employment in Dr. Stephen Testa's Laboratory I helped set up a cell culture facility and established a protocol to harvested and purify the protein telomerase for the development of a new binding assay. Accordingly, during this time I was responsible for performing TRAP assays, developing protein purification processes, and synthesis of DNA oligonucleotides.

1997-2000 ***Lab Technician**, University of Kentucky, Sanders-Brown Center on Aging.* While employed in Dr. Mark P. Mattson's Laboratory I was responsible for euthanizing and dissecting animals to establishing and maintaining primary hippocampal neuron cultures for a group of over 20 postdocs and research scientist. I gained experience with genotyping and maintaining mouse colonies. I also maintained PC12, BCL2, HeLa, and many other mammalian cell lines. I assisted in establishing a clonal cell line that produced a high level of hTERT protein. I was responsible for planning and conducting my own research involving telomerase, mitochondrial respiration, oxidative stresses, and cellular apoptosis. During this time I became familiar with cell culture techniques, confocal microscopy, PCR, Micro-injection technologies, electrophoretic separation of small DNA and proteins.

ACKNOWLEDGEMENTS

1. Danaher RJ, McGarrell BS, Stromberg AJ, Miller CS. **Herpes simplex virus type 1 modulates cellular gene expression during quiescent infection of neuronal cells.** Arch Virol. 2008;153(7):1335-45. Epub 2008 Jun 12

2. Danaher RJ, Jacob RJ, Miller CS. **Reactivation from quiescence does not coincide with a global induction of herpes simplex virus type 1 transactivators**. Virus Genes. 2006 Oct;33(2):163-7.

3. Miller CS, Danaher RJ, Jacob RJ. **ICP0 is not required for efficient stress-induced reactivation of herpes simplex virus type 1 from cultured quiescently infected neuronal cells.** J Virol. 2006 Apr;80(7):3360-8

4. Danaher RJ, Jacob RJ, Steiner MR, Allen WR, Hill JM, Miller CS. **Histone deacetylase inhibitors induce reactivation of herpes simplex virus type 1 in a latency-associated transcriptindependent manner in neuronal cells.** J Neurovirol. 2005 Jul;11(3):306-17.

HONORS

1998-1999 Oswald Research and Creativity grant, University of Kentucky
2006-2008 Academic Excellence Fellowship
May 17th 2009 **"Best student or post-doctoral presentation"** 11th Annual Midwest DNA Repair Symposium, Ann Arbour, MI

May 16th 2010 **"Best student presentation or post-doctoral presentation"**" 12th Annual Midwest DNA Repair Symposium, Louisville, KY

ASSOCIATIONS AND PRESENTATIONS

2006-2011 **Graduate Student Council Representative** – interacted with student body and faculty to institute changes in student curriculum and qualifying criteria. As a council member I represented the student body to voice concerns about the program and took responsibilities in student recruitment and the organization of departmental happenings involving students. I also organized monthly graduate student outings to facilitate student fellowship and provide stewardship in introducing international students to the region.

2007-2011 **Microbiology, Immunology, and Molecular Genetics fall retreat organizational board** 2007-2011 **Kaplan mini-symposium planning committee, speaker recruitment** 2007-2011 **AAAS member PRESENTATIONS** Michael W. Killen. **"Loss of Bloom Syndrome protein causes destabilization of genomic architecture and is complemented by ectopic expression of *Escherichia coli* RecG in human cells."** Dissertation Defense Seminar. April 21, 2011

Michael W. Killen, Dawn M. Stults, Andrew J. Pierce. Presentation. **"Expression of bacterial RecG protein complements human Bloom syndrome cellular phenotypes**." 12th Annual Midwest DNA Repair Symposium, Louisville, KY, May 15-16, 2010 **"Best student or postdoctoral presentation Award"**

Michael W. Killen, Dawn M. Stults, Andrew J. Pierce. Presentation. **"Loss of Bloom syndrome protein destabilizes human genomic architecture."** 11th Annual Midwest DNA Repair Symposium, Ann Arbour, MI, May 16-17, 2009 **"Best student or post-doctoral presentation Award"**

Michael W. Killen, Dawn M. Stults, Andrew J. Pierce. Presentation. **"Loss of Bloom syndrome protein destabilizes human genomic architecture."** University of Kentucky Department of Microbiology, Immunology, and Molecular Genetics Departmental Seminar Series. March 13, 2009

Michael W. Killen, Dawn M. Stults, Andrew J. Pierce. Poster**. "A new assay for destabilization of genomic architecture in human chromosomally unstable cellls".**3rd Annual Markey Cancer Center Research Day, University of Kentucky, October 30, 2008

Michael W. Killen, Dawn M. Stults, Andrew J. Pierce. Poster. **"A new assay for destabilization of genomic architecture in human chromosomally unstable cells"** University of Kentucky Department of Microbiology, Immunology, and Molecular Genetics Departmental Fall Retreat. October 16, 2008.

Michael W. Killen, Dawn M. Stults, Heather H. Pierce, Andrew J. Pierce. Poster. **"A New Assay For destabilization of Genomic Architecture in Human Chromosomally Unstable Cells."** 10th Annual Midwest DNA Repair Symposium, Pittsburgh, PA, May 10-11, 2008.

Michael W. Killen, Dawn M. Stults, Heather H. Pierce, Andrew J. Pierce. Presentation. **"Human Genomic Architecture and Gene Cluster Instability?"** University of Kentucky Department of Microbiology, Immunology, and Molecular Genetics Departmental Seminar Series. February 29, 2008.

Michael W. Killen, Dawn M. Stults, Heather H. Pierce, Andrew J. Pierce. Presentation. **"Human Genomic Architecture and Recombinational Instability?"** University of Kentucky Department of Microbiology, Immunology, and Molecular Genetics Departmental Fall Retreat. October 5, 2007.

Michael W. Killen, Dawn M. Stults, Heather H. Pierce, Andrew J. Pierce. Poster.
"**Destabilization of Genomic Architecture in DNA Repair Deficient Cells"** Markey Cancer Research Day, University of Kentucky, September 27, 2007.

Michael W. Killen, Dawn M. Stults, Heather H. Pierce, Andrew J. Pierce. Poster.

"Destabilization of Genomic Architecture in DNA Repair Deficient Cells" 2nd Annual Clinical and Translational Science Spring Conference. Lexington, KY, June 12, 2007.

Michael W. Killen Presentation. **"Sirtuins: Guardians of the Genome?"** University of Kentucky Department of Microbiology, Immunology, and Molecular Genetics Departmental Seminar Series. September 29, 2006

I also regularly presented (about 8 times a year) at faculty lead journal clubs: Molecular Biology Journal Club, DNA Repair Journal club, and Cancer Biology Journal club.

STUDENTS MENTORED DURING INDEPENDENT RESEARCH

2003 Ryan Jawitz, "Requirement of the LAT gene for Reactivation of HSV-1 from QIF-PC12 cells". Lake Erie College of Osteopathic Medicine, Bradenton, FL 2008

2003 William Allen, "Growth of LAT negative HSV-1 in Corneal and NDPC12cells". & "Growth and Reactivation of HSV-1 Alpha 0 Deletion Mutants from a Quiescent State". University of Kentucky College of Dentistry 2007

2003 Ashley Roe, "Human Osteosarcoma Cells Induce Reactivation of HSV-1 from QIF-PC12 cells". Campbell University School of Pharmacy, Buies Creek, NC 2007

2003 Ravi Subramamarian, "Induction of Reactivation of HSV-1 from QIF-PC12 cells Requires a Cell-Associated Factor". University of Kentucky, Department of Microbiology, immunology, and molecular genetics, Ph.D. 2008

2005-2006 Thomas Birkenhauer "ICP0 is not required for efficient stress-induced reactivation of herpes simplex virus type 1 from cultured quiescently infected neuronal cells."
University of Kentucky College of Dentistry 2010, Current Partner at Blugrass Oral Health, Bowling Green, KY

2004-2006 Brandon McGarell, "Herpes simplex virus type 1 modulates cellular gene expression during quiescent infection of neuronal cells" University of Kentucky College of Dentistry 2007

2004 Christopher Trimby University of Kentucky, Department of Physiology, doctoral candidate 2010

2004 Sarah Goodin "Herpes simplex virus type 1 modulates cellular gene expression during quiescent infection of neuronal cells" University of Kentucky 2006

2005-2006 Pam Keller "Reactivation from quiescence does not coincide with a global induction of herpes simplex virus type 1 transactivator TSA." University of Kentucky 2006

2005-2006 Whitney Walters "Reactivation from quiescence does not coincide with a global induction of herpes simplex virus type 1 transactivator heat shock." University of Kentucky 2006

2005 Eric Lin "Reactivation from quiescence does not coincide with a global induction of herpes simplex virus type 1 transactivator forskolin" University of Stanford 2009

2006 Meena Chelvayohan "Gene chip analysis of Herpes simplex virus type 1 during quiescent infection of neuronal cells" Ohio State University 2010

2008 Mathew Ruwaya " Genetic and functional analysis of a new recombination reporter construct" Department of Biosystems and Agricultural Engineering, MS University of Kentucky 2011

2008 Andrea Asher "Gene cluster analysis of K562 NCI cancer cell line" University of Kentucky 2009

2009 Sara Wheler "Gene cluster analysis of Human cancer tissue" Morehead State University 2010

2009-2011 Erica Williamson “Human ribosomal RNA gene clusters are recombinational hotspots in cancer” University of Kentucky 2010

2010-2011 Tiffany Taylor “Analysis of the GAGE cluster as recombinational hotspots in cancer” University of Kentucky 2011