

# Grace Naanyu Kisirkoi

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## EDUCATION

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- 2013 - 2017      **PHD GENETICS**  
Clemson University, USA  
Dissertation title: Acetate transport is essential for survival and virulence of *Cryptococcus neoformans*.
- 2009 - 2012      **MS GENETICS**  
Jomo Kenyatta University, Kenya  
Dissertation title: Microsatellite marker and phenotypic characterization of *Lablab purpureus* aphid resistance.
- 2005 - 2009      **BS MEDICAL MICROBIOLOGY**  
Jomo Kenyatta University, Kenya  
Honors thesis title: Treatment of BALB/c mice experimentally infected with *Schistosoma mansoni*.

## SKILLS SUMMARY

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Dissertation/Thesis writing (9 years), Mammalian cell culture (6 years), Genome editing (8 years), Infectious disease biomarker discovery (5 years), Cancer biomarker discovery (1 year), Biochemical enzyme assays (5 years), Protein isolation (3 years), Antibody conjugation (Less than 1 year), Multiplexed immunostaining (5 years), Western blotting (3 years), Microscopy (3 years), Cell culture (5 years), Lab management (Less than 1 year), Leukocytes such as PBMC and PMN isolation (5 years), Cryopreservation (6 years).

## RESEARCH EXPERIENCE

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- 2017 - 2018      **POSTDOCTORAL RESEARCH FELLOW**  
**Stanford University, USA**
- Breast cancer cell line culture, *Mycoplasma* PCR, immunostaining, and hormone receptor-targeted therapy.
  - Conjugate antibodies to DNA oligonucleotides for deep immunophenotyping of circulating tumor cell and cell lines using CODEX, a cutting edge immunoplexing technology.
  - Liquid biopsy to capture circulating breast cancer tumor cells from a xenograft mouse model implanted with human tumor cells.
  - Lab management - Liaise with vendors to negotiate lab equipment prices, purchase lab reagents, inventory, biosafety compliance.
  - Mentor students undertaking research on breast cancer metastasis in a patient-derived orthotopic xenograft mouse model.
- 2013 - 2017      **GRADUATE RESEARCHER**  
**Clemson University, USA**
- Investigated virulence roles of CNAG 05678 and CNAG 05266 during knockout *C. neoformans* coculture with the immune cells:

mouse macrophage- J774 cell line, mouse bone marrow derived macrophages, human neutrophils, and human peripheral blood mononuclear cells, and during virulence factor induction.

- Investigated pathogenic significance of CNAG 05678 and CNAG 05266 in *C. neoformans*-infected C57BL/6 mice and *Galleria mellonella* larvae.
- Determined regulation and significance of *Cryptococcus neoformans* acetate metabolism by qPCR, western blotting, gas chromatography and hydroxamate assay-based detection of acetate, radiolabeled acetate uptake assays and fluorescent tagging of acetate transporters visualized through fluorescent and light microscopy.
- Characterized adaptational significance of 2 *Cryptococcus neoformans* acetate transporters (CNAG 05678 and CNAG 05266) by subjecting the yeast's deletion knockouts to environmental stressors such as carbon sources, minerals, temperature, antifungals and pH following cell counts using flow cytometry and cell counter.
- Investigated significance of CNAG 05678 and CNAG 05266 in acetate export during growth of gene knockouts on glucose by measuring acetate recovered from culture supernatant using enzyme (*Methanosarcina thermophila* Acetate Kinase) assays, radiolabeled <sup>14</sup>C acetate, gas chromatography-flame ionization detection.
- Performed cloning and mating experiments to insert a molecular fluorescent tag and complement knockouts for phenotype analysis and confirmation.
- Periodically presented findings to dissertation committee and annual professional workshops while writing up analyzed results for publication. During professional workshops, I forged relationships that became long-term collaborations to extend our lab's *in vivo* research capabilities.
- Participated in professional development courses: analytical techniques- GC/MS, GC/FID, LC/MS, MS/MS, molecular mycology-applications in animal research models, cell biological analysis of native and recombinant genes, cloning best practices, cell growth principles.
- Trained undergraduate Genetics and Biochemistry majors on best molecular mycology practices in growing *C. neoformans* and characterizing roles of their acetate transporters.

2012 - 2013

**RESEARCH TECHNICIAN**  
Clemson University, USA

- Genomic DNA isolation of *C. neoformans* xylulose 5-phosphate/fructose 6-phosphate phosphoketolase and *E. coli* plasmid purification for cloning into an expression vector.

05.2005 - 07.2008

**HONORS RESEARCH INTERN**  
SUPERVISOR - DR. DORCAS YOLE  
Institute of Primate Research, Kenya

- Processed eggs isolated from stool samples of *Papio anubis* baboon reservoir of *Schistosoma mansonii*, infected *Biomphalaria* snails with eggs, isolated cercaria from infected snails to infect BALB/c mice, treated infected mice with varying doses of praziquantel and monitored response, sacrificed moribund mice and analyzed tissues for granuloma, schistosomes and adhesions.
- Trained incoming interns.

## TEACHING EXPERIENCE

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2014 - 2016

### TEACHING ASSISTANT

Clemson University, USA

- Population Genetics Lab-guided 40 third and fourth year undergraduate genetics majors in analysis of population-wide allele frequencies from select study systems using bioinformatics tools. Set and graded weekly quizzes and lab reports.
- Fundamental Genetics Lab- guided 57 sophomores, juniors and seniors in performing genomic and plasmid DNA purification for prokaryotic and eukaryotic cloning, gene mapping, subsequent phenotypic analysis, and lab report writing. Set and graded weekly quizzes and lab reports.

08.2010 - 09.2012

### TEACHING ASSISTANT

Jomo Kenyatta University, Kenya

Kenya Medical Research Institute, Human Papilloma Virus Lab

- Prepared teaching and examination material, lectured and graded 40 freshmen and sophomores taking Cell Biology and Introduction to Genetics.
- Guided 10 MS Tropical Medicine and Infectious Diseases students through Virology labs entailing human genomic DNA isolation from cervical swabs and blood using PCR and southern blot characterization of Human Papilloma Virus genotypes.

## TEACHING AWARDS

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02.2017

-Outstanding Teaching Assistant Nominee

05.2015

-Outstanding Teaching Assistant, \$500

## AWARDS AND GRANTS

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07.2016

-Wade Stackhouse Fellowship, \$10,000

06.2016

-Award of Excellence in *in vivo* Research and Animal Handling, Molecular Mycology Course, MBL, Woods Hole

06.2016

-Molecular Mycology Course Grant, MBL Woods Hole, \$3,004

04.2016

-Professional Enrichment Grant, Mouse Model and Human Phagocytes Experiments Aid, \$750

04.2016

-Professional Enrichment Grant, Molecular Mycology Course Travel Grant, \$750

07.2015

-Wade Stackhouse Fellowship, \$10,000

01.2015

-American Society for Cell Biology  
Share your Science Video Contest 3<sup>rd</sup> winner, \$100

## PUBLICATIONS

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- 02.2018 **Kisirkoï G.**, 2018. Utilizing gas chromatography-flame ionization detection to measure extracellular acetate produced by *Cryptococcus neoformans* in media during growth. *Submitted*.
- 04.2017 **Kisirkoï G.**, Yijian Q., Luckie B., and Smith K. 2017. The acetate transporters, *Ady2* and *Ato2* contribute to metabolic adaptation of *Cryptococcus neoformans*. *In preparation*.
- Kisirkoï G.**, Yijian Q., Luckie B., Specht Charlie, Levitz Stuart, and Smith K. 2017. The acetate transporters, *Ady2* and *Ato2* are essential for virulence of *Cryptococcus neoformans*. *In preparation*.
- 07.2012 Monograph: **Kisirkoï G.**, 2012. Efficacy of praziquantel, the antischistosomal drug, Lambert Academic Publishing, Germany.
- 05.2012 Book Chapter: Ngware E. and **Kisirkoï G.** 2012. Management of insect pests of *Lablab purpureus*, *Dolichos* Project, Kenya.
- 05.2012 Book Chapter: **Kisirkoï G.** 2012. Microsatellite (SSR) marker characterization of *Lablab purpureus*, *Dolichos* Project, Kenya *Dolichos* Project, Kenya.

## CONFERENCES

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- 10.2017 - 11.2017 Course Participation and Facilitating: STEM Teaching Course to obtain best practices in teaching and learning in the STEM field both as a novice and an expert, Stanford University, California, USA.
- 10.2017 - 11.2017 Course Participation: Grant Writing Academy bootcamp to gain skills of the peer-review process and grant writing for major government funding sources, Stanford University, California, USA.
- 10.2016 Poster: 4<sup>th</sup> Annual Cell Biology of Eukaryotic Pathogens Symposium, Clemson University, South Carolina, USA.  
**Kisirkoï G.**, Yijian Q., Luckie B., and Smith K. 2016. Regulation of the acetate transporters, *Ady2* and *Ato2* for metabolic adaptation of *Cryptococcus neoformans*.
- 06.2016 Poster: 20<sup>th</sup> Annual Symposium of Molecular Mycology Course, Marine Biological Laboratories, Massachusetts, USA.  
**Kisirkoï G.**, Yijian Q., Luckie B., and Smith K. 2016. The acetate transporters, *Ady2* and *Ato2* are essential for virulence of *Cryptococcus neoformans*.
- 10.2015 Talk: 3<sup>rd</sup> Annual Cell Biology of Eukaryotic Pathogens Symposium, Clemson University, South Carolina, USA.  
**Kisirkoï G.**, and Smith K. 2015. *Ady2* and *Ato2* are required for *Cryptococcus neoformans* killing by human phagocytes.

- 09.2015                    Poster: Microbial Pathogenesis and Host Response Meeting  
Cold Spring Harbor Laboratories, New York, USA.  
**Kisirkoi G.**, and Smith K. 2015. The acetate transporters, *Ady2* and *Ato2* are required for *Cryptococcus neoformans* virulence in the invertebrate model, *Galleria mellonella*.
- 04.2015                    Talk: 25<sup>th</sup> Annual Molecular Biology/Vector Biology Symposium  
University of Georgia, Georgia, USA.  
**Kisirkoi G.**, and Smith K. 2015. *Cryptococcus neoformans* requires the acetate transporter, *Ady2* for acetate uptake.
- 10.2014                    Poster: 2<sup>nd</sup> Annual Cell Biology of Eukaryotic Pathogens  
Symposium, Clemson University, South Carolina, USA.  
**Kisirkoi G.**, and Smith K. 2014. The roles of acetate transport during growth of *Cryptococcus neoformans*.
- 04.2014                    Talk: Meeting of Southeastern Society of Parasitologists,  
Athens Georgia.  
**Kisirkoi G.**, and Smith K. 2014. Investigating the metabolic roles of acetate uptake during growth of *Cryptococcus neoformans*.
- 10.2013                    Poster: 1<sup>st</sup> Annual Cell Biology of Eukaryotic Pathogens  
Symposium, Clemson University, South Carolina, USA.  
**Kisirkoi G.**, and Smith K. 2014. *Cryptococcus neoformans* requires acetate transporters during growth on alternative carbon sources.
- 03.2010                    Attending: Africa Biological Safety Association Biosafety,  
Biosecurity and Bioethics Conference, Nairobi, Kenya.
- 03.2009                    Attending: Conference on Effective Project Planning and  
Evaluation for Biomedical Research, National Museums of Kenya.
- 12.2008                    Talk: 4<sup>th</sup> Jomo Kenyatta University of Agriculture and Technology  
Scientific Research Conference, Nairobi, Kenya.  
**Kisirkoi G.**, 2012. Efficacy of the antischistosomal drug, praziquantel in BALB/c mice experimentally infected with *Schistosoma mansoni*.

## EXTRACURRICULAR

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- 07.2017 - present                    Science Communication - Active learning techniques for teaching in STEM, script-writing for [Goggles Optional](#) podcast, [blogging on how cancers spread](#), assisting with video commentary on Stanford University's anniversary to commemorate the first successful heart transplant.
- 2015 - present                    Volunteer: Hospice and Perpetual Care- Occasionally provide companionship and run errands for seniors in need of perpetual care. Visited hospice (cancer) care patients and volunteered for Make a Wish Foundation children appreciation balls.
- 2012 - Present                    Writer: Engaged social media platforms (blog posts, Facebook and

Twitter posts) and emails to manage brand perception companies providing: malaria and TB detection products, and microscopes (Quantitative Buffy Coat Diagnostics), insurance products (Madison Insurance), financial investment (InvesteQ, Kenya) and social security products (Rwanda Social Security).

- 2014 - 2016 Secretary: Eukaryotic Pathogens Innovations Center Scholars- Wrote minutes and helped transport keynote speakers of student-organized annual symposia (Cell Biology of Eukaryotic Pathogens), Updated member data and planned socials celebrating milestones of undergraduate, graduate members and their academic advisors.
- 2014 - 2015 Senator: Genetics Graduate Students- Acted as liaison between graduate students in the Genetics program and the Graduate Student Government to review and vote for bills to allocate travel grants to conferences, ease parking and transportation and solicit participation in opinion polls to provide feedback.
- 2013 - 2015 Volunteer: Clemson University International Office- welcomed new students of diverse nationalities by sharing experiences to help with English as a second language, healthy study habits and pointing them to information sources about maintaining their study visas.
- 2015 Volunteer: Boy Scouts International Camporee- exhibited Kenyan cultural merchandize, language and answered boy scouts' questions towards their award of Cultures Merit Badges.
- 2014 Volunteer: South Carolina State 4 H Club Conference- exhibited Kenyan merchandize, demonstrated "the Peoples of Kenya" for cultural awareness on socioeconomical and cultural practices.
- 2014 Nominee: Clemson University Research Minute Video- upon nomination, gave a minute-long blurb on my research on acetate transport in *C. neoformans*, Its purpose was to exhibit an example of research projects being done in Clemson University to an audience not familiar with the topic, such as new students or potential applicants.
- 2012 - 2013 Social worker: Mogra Rescue Center, Kenya: Maintained records and tutored 120 orphaned and vulnerable children aged 5-17 years in English, Microsoft Word, Microsoft Excel, Science and Swahili. Solicited donor support from local and international well-wishers for food, school, and medical supplies of needy children. Worked with volunteer nurses to provide first response care to sickly and malnourished children who could not afford medical attention.