

Cait S. Kirby

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Summary of Qualifications

- Passionate trauma-informed teacher dedicated to promoting accessible content for all learners.
- Pedagogy workshop leader with experience working across disciplines at the Vanderbilt Center for Teaching.
- Mentor with an interest in pursuing research about marginalized groups in the academy.
- Mitochondrial biologist with experience improving laboratory courses.
- Researcher comfortable using and teaching *C. elegans* and *D. melanogaster*, and human DNA sampling.

Education

Vanderbilt University, Nashville, TN

- Ph.D. in Biological Sciences *Expected FA 2020*
Advisor: Dr. Maulik R. Patel
Title: Mitochondrial DNA (mtDNA) copy number is regulated by a functional output of the electron transport chain in *C. elegans*.

Smith College, Northampton, MA

- M.S. in Biological Sciences 2016
Advisor: Dr. Robert B. Merritt
Title: Xq28 inversion polymorphism: a student laboratory exercise, a population genetics study.
- B.A. in Biological Sciences and Anthropology 2012

Teaching Awards

- *Outstanding Graduate Student Lab Instructor*, Vanderbilt University 2018
- *Hickory Stick Teaching Assistant Award*, Vanderbilt University 2018

Relevant Certifications

- *Online Course Design Institute*, Vanderbilt University Center for Teaching *in progress*
- *Pursuing Respect, Inclusion, Diversity, and Equity*, Vanderbilt University 2020
- *Certificate in College Teaching*, Vanderbilt University, Center for Teaching 2019
- *Creating Assessments for the STEM Classroom*, CIRTL 2018

Refereed Publications

- **Kirby, C.S.**, and Patel, M.R. Elevated mitochondrial DNA copy number found in ubiquinone-deficient *clk-1* mutants is not rescued by ubiquinone precursor 2-4-dihydroxybenzoate. Under review, *Mitochondrion*.
- **Kirby, C.S.**, and Fedesco, H.N. Tell Me More About Alex: Helping Instructors Uncover and Mitigate Their Implicit Biases. Accepted, *To Improve the Academy*, May 2020.
- **Kirby, C.S.** Using Share-out Grids in the Online Classroom: from Icebreakers to Amplifiers. *BAMBE*, August 2020. <https://doi.org/10.1002/bmb.21451>
- Gitschlag, B.L., **Kirby, C.S.**, Samuels, D.C., Gangula, R.M., Mallal, S.A., Patel, M.R. Homeostatic Responses Regulate Selfish Mitochondrial Genome Dynamics in *C. elegans*. *Cell Met* July 2016. <https://doi.org/10.1016/j.cmet.2016.06.008>
- **Kirby, C.S.**, Kolber, N., Almohaidi, A., Bierwert, L.A., Saunders, L., Williams, S.A. and Merritt, R. Human Xq28 inversion polymorphism: From sex linkage to genomics - a genetic mother lode. *BAMBE* March 2016. <https://doi.org/10.1002/bmb.20933>

Teaching Experience

Vanderbilt University, Nashville, TN

Instructor: Certificate in College Teaching: STEM Specialization 2020

- Designed an online week-long pedagogy course for graduate students and postdocs.
- Taught graduate students and postdocs about application of pedagogy principles to STEM.
- Topics: science identity, stereotype threat, assessment, feedback, using technology, active learning, and more.
- 12 students, 120 minutes, 5 sessions.

Guest Lecturer: 9th-grade Biology Class – School for Science and Math at Vanderbilt 2019

- Title: *Cellular Engineering – Problem solving a genetic conundrum.*
- Designed a single-session active-learning presentation.
- Topics: mitochondrial DNA, endosymbiosis, mtDNA inheritance, heteroplasmy, and more.
- 18 students, 90 minutes, 1 session.

2018 & 2019

Grading Assistant: 100-level Biological Sciences Lecture Course

- Generated rubrics for exams and graded exams.
- Suggested changes to exam questions.
- 150 students, 4 exams per semester.

Instructor: 100-level Biological Sciences Course-based Undergrad Research Experience 2017 & 2018

- Title: [*Kicking out dad's genes: identifying the mechanisms of paternal mitochondrial DNA elimination.*](#)¹
- Designed a semester-long, course-based undergraduate research experience (CURE) project.
- Topics: *C. elegans* husbandry, peer feedback and review, hypothesis testing, and more.
- 15 students, 3 hours, twice weekly, full-semester course.

Invited Guest Lecturer: 300-level Ecology 2017 & 2018

- Title: *Why animals live in groups.*
- Designed a single-session active-learning presentation.
- Topics: group living, optimal group size, cheaters, vigilance, predation, and more.
- 18 students, 90 minutes, 1 session.

Curriculum Designer & Instructor: Introductory Biology Module 2017

- Title: *Can a single nucleotide change a population?*
- Designed a two-week long intensive biology introduction course to replace the lab curriculum.
- Topics: computational methods, protein structure/function, pathways, and more.
- 10 students, 3 hours, 4 sessions.

Invited Guest Lecturer: 100-level Science for Non-majors 2017

- Title: *What's your orientation? Xq28 inversion polymorphism.*
- Designed a single-session active learning presentation.
- Topics: X chromosome inheritance, sex-linkage, linkage disequilibrium, SNPs, and more.
- 50 students, 50 minutes, 1 session.

Teaching Assistant: 100-level Molecular Biology Laboratory 2016

- Trained students in proper techniques such as animal husbandry, microscopy, statistics, and more.
- Conducted weekly office hours outside of lab.
- Topics: Mendelian genetics, PCR, plant development, competition, ecology, evolution, and more.
- 16 students per section, 2 sections, 3 hours, once weekly, full-semester course.

Smith College, Northampton, MA

Teaching Assistant: 100-level Genetics, Evolution and Molecular Biosciences Laboratory 2012 & 2015

- Assisted in lab instruction and clarified student questions.
- Prepared materials and experiments for instructor.
- Topics: Mendelian genetics, mitosis, linkage disequilibrium, DNA replication, and more.
- 16 students per section, 2 sections, 3 hours, once weekly, full-semester course.

Teaching Assistant: 200-level Animal Physiology Laboratory Course 2014

- Generated set-up guides for use in future semesters.
- Created instructor lab manual for use in future semesters.
- Prepared materials and experiments.
- Topics: blood oxygenation, EKG, EEG, muscle physiology, metabolism, and more.
- 16 students per section, 2 sections, 3 hours, once weekly, full-semester course.

Grading Assistant: 200-level Animal Physiology Lecture Course 2014

- Generated exam questions and conducted quality control on exam questions.
- Generated rubrics for exams and graded exams.
- Created course study guide linking readings, lecture content, and exam questions.
- Topics: muscle physiology, hormonal cascades, metabolism, and more.
- 55 students, 120 minutes, twice weekly, full-semester course.

Instructor: 100-level Genetics, Evolution and Molecular Biosciences Laboratory 2013

- Instructed proper lab protocols and experiments.
- Guided students in proper techniques including pipetting, setting up PCR, animal husbandry, and more.
- Conducted weekly office hours outside of lab.
- Prepared materials and laboratory manual.
- Topics: Mendelian genetics, mitosis, linkage disequilibrium, DNA replication, and more.
- 16 students per section, 2 sections, 3 hours, once weekly, full-semester course.

University of Massachusetts, Amherst, Amherst, MA

Guest Lecturer: 100-level Biology Course 2014

- Title: *What's Your Orientation?: A teaching lab, a population genetics study.*
- Designed a single-session lecture presentation
- Topics: X chromosome inheritance, sex-linkage, linkage disequilibrium, SNPs, and more.
- 125 students, 50 minutes, 1 session.

Pedagogy Workshop Presentations

Vanderbilt University, Nashville, TN

Invited Presenter: Vanderbilt University Writing Studio *forthcoming*

- Title: *Promoting Science Identity During Tutoring Sessions*
- Designed an interactive online workshop.
- Topics: science identity, belonging, zone of proximal development, student motivation, and more.
- 12 participants per session, 50 minutes, 2 sessions.

Invited Presenter: Vanderbilt University Collaborative for STEM Education and Outreach 2020

- Title: *Promoting Belonging in the STEM Classroom: How Belonging is the Key to Inclusivity*
- Designed an interactive online workshop.
- Topics: science identity, belonging, inclusion, Universal Design for Learning, and more.
- 14 participants, 55 minutes, 1 session.

Presenter: Teaching Assistant Orientation Module 2018, 2019, 2020

- Title: *How to be a TA: Tips, Tricks, and Techniques*
- Designed a two-day intensive course in teaching assistant duties and inclusive teaching.
- Designed active learning activities to promote recall of new content.
- Topics: unconscious bias, confirmation bias, resources, policies and procedures, and universal design.
- 10 participants, 2 hours, 4 sessions.

Invited Presenter: Vanderbilt Center for Teaching & Office of Inclusive Excellence 2019

- Title: *Promoting Belonging in the STEM Classroom Workshop*
- Shared theory and practice in promoting belonging of marginalized students in the STEM classroom.
- Designed two activities to uncover unconscious biases and mitigate their effect on students.
- Topics: stereotype threat, active learning strategies, knowing students, inclusive language, and more.
- 14 participants per session, 3 hours, 2 sessions.

Relevant Work Experience

Vanderbilt University, Nashville, TN

Teaching Affiliate, Center for Teaching 2018-present

- Attend workshops related to pedagogy.
- Consult with graduate teaching fellows regarding diversity, equity, inclusion, and more.
- Generate content and materials regarding disability accommodations.

Smith College, Northampton, MA

Program Assistant, Mellon Mays Undergraduate Fellowship 2014-2015

- Coordinated, planned, and oversaw events for undergraduates, mentors, and advisory committee.
- Assisted in managing a nearly \$400,000 grant.
- Processed and handled student, mentor, and event budgets as well as reimbursements.
- Coordinated applications for the new group of Mellon Mays fellows.

Program Facilitator & Office Assistant, Office of Disability Services 2012-2015

- Conceived, implemented, and oversaw the [Peer Mentoring Program](#).²
- Conceived, implemented, and oversaw the first Disabled Students Orientation.
- Managed accommodations for students with disabilities.
- Made documents accessible to students with learning and visual disabilities using ABBYY finereader software.
- Maintained the office website.

University Service

Vanderbilt University, Nashville, TN

- University Committee on Teaching 2020-present
- Laboratory Mentor to 3 undergraduate and 3 graduate students 2015-present
- [Inclusivity in the Biosciences Association Founding Member](#)³ 2016-2020
- Graduate Student Disability Accommodations Committee 2019-2020
- VUWiSE - Women in Science and Engineering Member 2019-2020
- Biological Sciences Grad Student Assn: President 2018-2019
- Inclusivity in the Biosciences Treasurer 2016-2018
- Biological Sciences Grad Student Assn: Professional Development Chair 2017-2018
- Biological Sciences Grad Student Assn: Social Chair 2016-2017

Smith College, Northampton, MA

- Alumnae Association Class of 2012 President 2012-2017
- Laboratory Mentor to 5 undergraduate students 2012-2015
- Laboratory Mentor to 1 high school student 2012-2014
- [Student Speaker at Smith College Commencement](#)⁴ 2012
- Senior Class President 2011-2012
- Biological Sciences STEM Mentor 2011-2012
- Junior Class President 2010-2011
- Anthropology Club Co-Chair 2010-2011
- Biological Sciences Grad Student Assn: Social Chair 2010-2011

Professional Affiliations

- Professional and Organizational Development (POD) Network, member 2020-present
- Society for the Advancement of Biology Education Research, member 2020-present
- Disabled Academic Collective, Discord Server Moderator 2020-present

Non-Refereed White Papers

- Best Practices and Recommendations for Graduate Student Disability Accommodations *in progress*
- Graduate Student Disability Accommodations at Vanderbilt University 2020

Public Engagement

- Invited blog post series about mentoring disabled graduate students *in progress*
- [September 7th, 2020 Interactive Fiction, resulting in 135,000+ views to my website.](#)⁵ 2020
- [Chronicle of Higher Education Profile.](#)⁶ 2020
- [Higher Ed Geek Podcast Episode.](#)⁷ 2020
- [Blog post about COVID-19 and disability access.](#)⁸ 2020
- [Blog post about executive functions and teaching problem solving.](#)⁹ 2020
- [Invited blog post about using active learning games in teaching assistant orientation.](#)¹⁰ 2020
- [Trauma-informed teaching video.](#)¹¹ 2020
- [Blog post about my experience at the 2019 CIRTL forum.](#)¹² 2019

Awards, Honors, and Grants

Vanderbilt University, Nashville, TN

- Ruth L. Kirschstein NRSA F31 Predoctoral Fellowship \$30k/year 2018-2021
- Professional Development Grant, Graduate Leadership Institute \$1,000 2019
- Trans-Institutional Program Grant: Black Women in STEM Project \$200 2019
- Best Short Research Talk, Biological Sciences Annual Retreat 2018
- Best Poster Award, Biological Sciences Annual Retreat 2017
- Wilens Graduate Fellowship \$12k/year 2013-2015
- Teaching Fellowship \$12k/year 2012-2013
- Received Student Leadership Programming Excellence Award 2012
- Nominated for Student Leader of the Year Award 2012
- Latin Honors Commendation 2012
- Dean's List 2011-2012

Workshops Attended

- Society for the Advancement of Biology Education Research (SABER) (*online*)
 - *Language Matters: Considering Racial Microaggressions in Science*, Dr. C. Harrison 2020
 - *Lessons from a hot spring: Authentic transformation in the higher ed class*, Dr. B. Dewsbury 2020
 - *Actionable steps toward equity in STEM*, S. Sharp and Dr. J. Matsui 2020
 - *Race REALLY matters*, Dr. D. Asai 2020
- Vanderbilt University Women in the Academy
 - *Trust and Boundaries in the Classroom*, Dr. A. Bowden, Dr. B. McKenzie, Dr. C. Taaffe 2020
- Vanderbilt University Center for Teaching
 - *Leading Online Synchronous Discussions (online)* 2020
 - *Equitable and Inclusive Teaching (online)* 2020
 - *Learning at Play: a one-day symposium on games for learning and social change* 2019
 - *How groups of students are differentially impacted by active learning*, Dr. S. Brownell 2019
 - *Celebration of Learning: Student Presentations* 2018
- Vanderbilt University Writing Studio
 - *Responding to Student Writing*, Dr. M. Minarich 2020
- Conference on College Composition and Communication
 - *Interrogating, Responding, Reconfiguring Disability in College Composition (online)* 2020
- Vanderbilt University Biomedical Research Education and Training (BRET) Office
 - *Preparing for a Teaching Demo*, Dr. C. Brame 2020
- Vanderbilt University Department of Biological Sciences
 - *Undergraduate Learning Assistant Poster Presentation* 2019
 - *Improving student learning through reasoning and problem solving*, Dr. J. Knight 2019
 - *How learning works: a framework for evidence-based college science teaching*, Dr. C. Brame 2017
- Vanderbilt University Inclusivity in the Biosciences Association
 - *Mentorship as a network*, Dr. L. Esters 2019

Conferences Attended

- Center for the Integration of Research, Teaching, and Learning (CIRTL)
 - 6th Annual CIRTL Forum: *Preparing Future Faculty Toward Inclusive STEM Higher Ed* 2019
- United Mitochondrial Disease Foundation
 - Mitochondrial Medicine Scientific and Clinical Meeting 2018
- Genetics Society of America
 - 21st International *C. elegans* Conference 2017
- Metabolism, Aging, Pathogenesis, and Stress in *C. elegans*
 - *C. elegans* Topics Meeting 2016

Research

Vanderbilt University, Nashville, TN

2015-present

Dissertation Research

Advisor: Dr. Maulik. R. Patel

Title: *Mitochondrial DNA (mtDNA) copy number is regulated by a functional output of the electron transport chain in C. elegans.*

- Developed *Caenorhabditis elegans* as a model to study copy number regulation.
- Developed a sensitive and reproducible qPCR technique to quantitatively measure mtDNA copy number.
- Measured mtDNA copy number across a number of mtDNA mutant strains.
- Identified differences in total copy number between mutant strains.
- Identified a candidate protein that regulates mtDNA copy number.

Smith College, Northampton, MA

2012-2015

Master's Research

Advisor: Dr. Robert B. Merritt

Title: *Xq28 inversion polymorphism: a student laboratory exercise, a population genetics study.*

- Conducted human sampling in various populations across multiple institutions.
- Managed full project budget, independent research laboratory and associated equipment.
- Maintained relationships with vendors and negotiated for discounted equipment and consumables pricing.
- Optimized a traditional PCR protocol and an iPCR protocol for a student teaching lab.
- Developed PCR and sequencing protocols to detect and analyze SNPs.

Undergraduate Research

2011-2012

Advisor: Dr. Robert B. Merritt

Title: *Xq28 inversion polymorphism: optimizing a DNA extraction method*

- Developed a Fluorescence *In-Situ* Hybridization protocol for use with inversion polymorphism laboratory.
- Optimized a DNA extraction protocol for use with students.

Scientific Techniques

- PCR
- gel electrophoresis
- cloning
- Western blotting
- Southern blotting
- antibody generation
- fluorescence microscopy
- Sanger sequencing
- qPCR
- RT-qPCR
- ddPCR
- iPCR
- DNA extraction
- human sampling
- *C. elegans* husbandry
- *D. melanogaster* husbandry
- pharmacologic manipulations
- genetic manipulations
- protein purification
- lifespan assays
- development assays
- IRB proposal design
- fluorescence *in-situ* hybridization
- bacterial culturing
- Sanger sequencing
- ultradian rhythm measurements
- mutagenesis
- data analysis

Analysis Software, Programming Languages, and Web Technologies

- Excel
- R & R studio
- MAXQDA
- FIJI
- HTML
- CSS

Learning Software and Programs

- Padlet
- Twine
- Brightspace
- Canvas LMS
- Blackboard
- PollEverywhere
- Canva Graphic Design
- FlipGrid
- Google Jamboard
- Google Docs, Sheets, Slides
- Piazza
- Perusall

Pedagogy-related One-pagers

- [office hours](#)¹³
- [metacognition](#)¹⁴
- [self-care](#)¹⁵
- [accommodations](#)¹⁶
- [growth mindset](#)¹⁷
- [C. elegans basics](#)¹⁸
- [Universal Design for Learning](#)¹⁹
- [instructional scaffolding](#)²⁰
- [backward design](#)²¹
- [rubrics](#)²²
- [grading](#)²³

Non-Refereed Research Publications

- **Kirby, C.** Xq28 Inversion Polymorphism: A teaching lab, a population genetics study. MS Thesis. 2016. Smith College.
- **Kirby, C.** Xq28 Inversion Polymorphism Assay: Another Approach. Clark Science Center 2014 Women in Science, Smith College.

- **Kirby, C.** What's Your Orientation: Long PCR Analysis of the Xq28 Region. Clark Science Center 2012 Women in Science, Smith College.
- **Chen, N., and Cait Kirby.** The XQ28 Region and Its Role in Developing a Teaching Lab Project. Clark Science Center 2011 Women in Science, Smith College. (*Contributed equally*)

Research Presentations

- **Kirby, C.S.,** and Maulik R. Patel. mtDNA copy number is regulated by a functional output of the electron transport chain. Worm Interest Group Meeting. Nashville, TN. November 2019.
- **Kirby, C.S.,** and Maulik R. Patel. mtDNA copy number is regulated by a functional output of the electron transport chain. Research in Progress talk. Nashville, TN. October 2019.
- **Kirby, C.S.,** and Maulik R. Patel. mtDNA copy number is regulated by a functional output of the electron transport chain. United Mitochondrial Disease Foundation Annual Meeting. Nashville, TN. June 2018.
- **Kirby, C.S.** mtDNA copy number is regulated by a functional output of the electron transport chain. Vanderbilt University Biological Sciences Annual Retreat. Nashville, TN. May 2018.
- **Kirby, C.S.** mtDNA copy number is regulated by a functional output of the electron transport chain. Vanderbilt University Worm Interest Group Meeting. Nashville, TN. March 2018.
- **Kirby, C.S.** and Maulik R. Patel. mtDNA copy number is regulated by a functional output of the electron transport chain. International C. elegans Conference. UCLA. Los Angeles, CA. June 2017.
- **Kirby, C.S.** and Maulik R. Patel. mtDNA copy number is regulated by a functional output of the electron transport chain. Vanderbilt University Biological Sciences Annual Retreat. Nashville, TN. May 2017.
- **Kirby, C.S.** and Maulik R. Patel. mtDNA copy number is regulated in *C. elegans*. Vanderbilt University Cell and Developmental Biology Annual Retreat. Nashville, TN. September 2016.
- **Kirby, C.S.** and Maulik R. Patel. mtDNA copy number is regulated in *C. elegans*. Topics Meeting: Aging, Metabolism, Stress, Pathogenesis, and Small RNAs in *C. elegans*. Madison, WI. June 2016.
- **Kirby, C.,** Robert B. Merritt. What's Your Orientation? Xq28 Inversion Polymorphism. Annual Gene Families and Isozymes Conference. St Martin. December 2014.
- Merritt, R.B., **Cait S. Kirby.** Human Xq28 Inversion Polymorphism. Annual Gene Families and Isozymes Conference. St Martin. December 2014.
- **Kirby, C.,** L Bodt, L Bierwert, L Saunders, S Williams, R Merritt. What's Your Orientation? An Inversion Polymorphism Assay. Poster presentation at annual UMASS Amherst Undergraduate Life Sciences Research Symposium. 2013.
- **Kirby, C.,** L Bodt, L Bierwert, L Saunders, S Williams, R Merritt. What's Your Orientation? An Inversion Polymorphism Assay. Poster presentation at annual Smith College Celebrating Collaborations Conference, 2013.
- **Kirby, C.,** N Chen, L Bierwert, L Saunders, S Williams, R Merritt. What's Your Orientation?: A Teaching Lab. Poster presentation at annual Smith College Celebrating Collaborations Conference, 2012.
- **Kirby, C.,** The Ethics of Genital Surgery on Infants with Disorders of Sex Development. Five-College Anthropology Conference. 2012.

¹ <https://bit.ly/dads-genes>

² <https://www.smith.edu/about-smith/disability-services/support-mentoring>

³ <https://inclusivitybiosciences.wordpress.com/>

⁴ <https://www.smith.edu/video/commencement-2012-student-speaker>

⁵ <https://caitkirby.com/downloads/Fall%202020.html>

⁶ <https://www.chronicle.com/article/a-ph-d-student-simulated-a-day-in-the-life-of-a-covid-19-era-campus-it-went-viral-but-it-wasnt-pretty>

⁷ <https://www.higheredgeek.com/blog/podcast-episode-92-cait-kirby>

⁸ <https://disabledacademicco.wixsite.com/mysite/post/covid-19-and-remote-work-access-for-whom>

⁹ <https://caitkirby.com/blog/2020-05-executive-functions.html>

¹⁰ <https://cft.vanderbilt.edu/2020/01/incorporating-games-into-ta-orientation/>

¹¹ <https://www.youtube.com/watch?v=m8eJgbt3htw>

¹² <https://caitkirby.com/blog/2019-12-CIRTL-forum.html>

¹³ <https://caitkirby.com/downloads/OfficeHoursCSK2020.pdf>

¹⁴ <https://caitkirby.com/downloads/Metacognition.pdf>

¹⁵ <https://caitkirby.com/downloads/SelfCareCSK2020.pdf>

¹⁶ <https://caitkirby.com/downloads/AccommodationsCSK2020.pdf>

¹⁷ <https://caitkirby.com/downloads/HealthyMindset.pdf>

¹⁸ <https://caitkirby.com/downloads/CElegansBasics.pdf>

¹⁹ <https://caitkirby.com/downloads/UniversalDesignCSK2020.pdf>

²⁰ <https://caitkirby.com/downloads/InstructionalScaffoldingCSK2020.pdf>

²¹ <https://caitkirby.com/downloads/BackwardDesignCSK2020.pdf>

²² <https://caitkirby.com/downloads/RubricsCSK2020.pdf>

²³ <https://caitkirby.com/downloads/GradingCSK2020.pdf>