

Curriculum Vitae

Rajiv C. McCoy

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Professional experience

- 2018–Present Assistant Professor, Department of Biology
Johns Hopkins University, Baltimore, MD
- 2017–2018 Postdoctoral Research Associate, Department of Ecology and Evolutionary Biology
Princeton University, Princeton, NJ
Advisor: Joshua Akey
- 2015–2017 Senior Fellow, Department of Genome Sciences
University of Washington, Seattle, WA
Advisor: Joshua Akey

Education

- 2015 PhD in Biology
Stanford University, Stanford, CA
Advisors: Dmitri Petrov & Carol Boggs
- 2010 BS in Biology; Ecosystem Science & Policy, *summa cum laude*
University of Miami, Coral Gables, FL

External research support

ACTIVE

- 2019–2024 NIH/NIGMS R35GM133747
Maximizing Investigators' Research Award for Early Stage Investigators
Role: PI
Title: "Functional and fitness consequences of human genetic variation"

Fellowships, honors, & awards

2020	Johns Hopkins University Institutional Nominee, Pew Scholars Program
2020	Johns Hopkins University Institutional Nominee, Searle Scholars Program
2017	Reviewers' Choice Abstract Award, American Society of Human Genetics
2015–2017	Genome Training Grant (NIH/NHGRI T32), U. of Washington, Dept. of Genome Sciences
2015	Epstein Trainee Award for Excellence in Human Genetics Research – Finalist, ASHG
2014	Office of Graduate Education Travel Award, Stanford University
2013 & 2012	Excellence in Teaching Award, Stanford University, Department of Biology
2012	Rosemary Grant Award, Society for the Study of Evolution
2012	Arthropod Genomics Consortium i5K Workshop Fellowship Award
2010–2013	Stanford University Graduate Fellowship in Science & Engineering
2010	Phi Beta Kappa Society
2010	Abess Center for Ecosystem Science and Policy Award, University of Miami

Publications & presentations

ARTICLES UNDER REVIEW

- Brosens, J. J., Quenby, S., Ramhorst, R., Lucas, E. S., Coomarasamy, A., Kuroda, K., Abrahams, V., Bennett, P. R., **McCoy, R. C.** The science of miscarriage: concepts and mechanisms.

RESEARCH AND REVIEW ARTICLES (PEER REVIEWED)

- 2020 Starostik, M. R., Sosina, O. A., **McCoy, R. C.** (2020), Single-cell analysis of human embryos reveals diverse patterns of aneuploidy and mosaicism. *Genome Research*, 30: 814–825. DOI: [10.1101/2020.01.06.894287](https://doi.org/10.1101/2020.01.06.894287)
- 2020 Yan, S. M., **McCoy, R. C.** (2020), Archaic hominin genomics provides a window into gene expression evolution. *Current Opinion in Genetics & Development*, in press.
- 2020 Tyc, K. M., **McCoy, R. C.**, Schindler, K., Xing, J. (2020), Mathematical modeling of human oocyte aneuploidy. *Proceedings of the National Academy of Sciences USA*, 117(19): 10455–10464. DOI: [10.1073/pnas.1912853117](https://doi.org/10.1073/pnas.1912853117)
- 2019 Sharma, R., Singh, P., **McCoy, R. C.**, Lenz, S. M., Donovan, K., Ochoa, M. T., Estrada-Garcia, I., Silva-Miranda, M., Jurado-Santa Cruz, F., Balagon, M. F., Stryjewska, B., Scollard, D. M., Pena, M. T., Lahiri, R., Williams, D. L., Truman, R. W., Adams, L. B. (2019), Isolation of *Mycobacterium lepromatosis* and development of molecular diagnostic assays to distinguish *M. leprae* and *M. lepromatosis*. *Clinical Infectious Diseases*: ciz1121. DOI: [10.1093/cid/ciz1121](https://doi.org/10.1093/cid/ciz1121)
- 2019 Gruhn, J. R., Zielinska, A., Shukla, V., ..., **McCoy, R. C.** (23/28), ..., Hoffmann, E. R. (2019), Chromosome errors in human eggs shape natural fertility over reproductive lifespan. *Science*, 365(6460): 1466–1469. DOI: [10.1126/science.aav7321](https://doi.org/10.1126/science.aav7321)
- 2019 Victor, A. R., Tyndall, J. C., Brake, A. J., Lepkowski, L. T., Murphy, A., Griffin, D. K., **McCoy, R. C.**, Barnes, F. L., Zouves, C. G., Viotti, M. (2019), One hundred mosaic embryos transferred prospectively in a single clinic: exploring when and why they result in normal pregnancies. *Fertility & Sterility*, 111(2): 280–293. DOI: [10.1016/j.fertnstert.2018.10.019](https://doi.org/10.1016/j.fertnstert.2018.10.019)
- 2019 Victor, A. R., Griffin, D. K., Brake, A. J., Tyndall, J. C., Murphy, A., Lepkowski, L. T., Lal, A., Zouves, C. G., Barnes, F. L., **McCoy, R. C.**, Viotti, M. (2019), Assessment of aneuploidy

- concordance between clinical trophectoderm biopsy and blastocyst. *Human Reproduction*, 34(1): 181–192. DOI: [10.1093/humrep/dey327](https://doi.org/10.1093/humrep/dey327)
- 2018 Tucci, S., Vohr, S. H., **McCoy, R. C.**, Vernot, B., Robinson, M., Barbieri, C., Fu, W., Purnomo, G. A., Sudoyo, H., Barbujani, G., Visscher, P. M., Akey, J. M., Green, R. E. (2018), Evolutionary history and adaptation of a human pygmy population of Flores Island, Indonesia. *Science*, 361(6401): 511–516. DOI: [10.1126/science.aar8486](https://doi.org/10.1126/science.aar8486)
- 2018 Press, M. O., **McCoy, R. C.**, Hall, A. N., Akey, J. M., Queitsch, C. (2018), Short tandem repeats with massive variation and functional consequences across strains of *Arabidopsis thaliana*. *Genome Research*, 28: 1169–1178. DOI: [10.1101/gr.231753.117](https://doi.org/10.1101/gr.231753.117)
- 2018 ***McCoy, R. C.**, *Newnham, L. J., Ottolini, C. S., Hoffmann, E. R., Chatzimeletiou, K., Cornejo, O. E., Zhan, Q., Zaninovic, N., Rosenwaks, Z., Petrov, D. A., Demko, Z. P., Sigurjonsson, S., Handyside, A. H. (2018), Tripolar chromosome segregation drives the association between maternal genotype at variants spanning *PLK4* and aneuploidy in human preimplantation embryos. *Human Molecular Genetics*, 27(14): 2573–2585. DOI: [10.1093/hmg/ddy147](https://doi.org/10.1093/hmg/ddy147) *co-first author
- 2018 Kort, J. D., **McCoy, R. C.**, Demko, Z. P., Lathi, R. B. (2018), Are blastocyst aneuploidy rates different between fertile and infertile populations? *Journal of Assisted Reproduction and Genetics*, 35(3): 403–408. DOI: [10.1007/s10815-017-1060-x](https://doi.org/10.1007/s10815-017-1060-x)
- 2017 **McCoy, R. C.** (2017), Mosaicism in preimplantation human embryos: when chromosomal abnormalities are the norm. *Trends in Genetics*, 33(7): 448–463. DOI: [10.1016/j.tig.2017.04.001](https://doi.org/10.1016/j.tig.2017.04.001)
- 2017 **McCoy, R. C.**, Wakefield, J., Akey, J. M. (2017), Impacts of Neanderthal-Introgressed Sequences on the Landscape of Human Gene Expression. *Cell*, 168(5): 916–927.e12. DOI: [10.1016/j.cell.2017.01.038](https://doi.org/10.1016/j.cell.2017.01.038)
- 2016 Vernot, B., Tucci, S., Kelso, J., Schraiber, J. G., Wolf, A. B., Gittelman, R. M., Dannemann, M., Grote, S., **McCoy, R. C.**, Norton, H., Scheinfeldt, L. B., Merriwether, D. A., Koki, G., Friedlaender, J. S., Wakefield, J., Pääbo, S., Akey, J. M. (2016), Excavating Neanderthal and Denisovan DNA from the genomes of Melanesian individuals. *Science*, 352(6282): 235–239. DOI: [10.1126/science.aad9416](https://doi.org/10.1126/science.aad9416)
- 2016 Demko, Z. P., Simon, A. L., **McCoy, R. C.**, Petrov, D. A., Rabinowitz, M. (2016), Effects of maternal age on euploidy in a large cohort of embryos analyzed with 24 chromosome single nucleotide polymorphism-based preimplantation genetic screening. *Fertility & Sterility*, 105(5): 1307–1313. DOI: [10.1016/j.fertnstert.2016.01.025](https://doi.org/10.1016/j.fertnstert.2016.01.025)
- 2015 **McCoy, R. C.**, Demko, Z., Ryan, A., Banjevic, M., Hill, M., Sigurjonsson, S., Rabinowitz, M., Petrov, D. A. (2015), Evidence of selection against complex mitotic-origin aneuploidy during preimplantation development. *PLoS Genetics*, 11(10): e1005601. DOI: [10.1371/journal.pgen.1005601](https://doi.org/10.1371/journal.pgen.1005601)
- 2015 **McCoy, R. C.**, Demko, Z., Ryan, A., Banjevic, M., Hill, M., Sigurjonsson, S., Rabinowitz, M., Fraser, H. B., Petrov, D. A. (2015), Common variants spanning *PLK4* are associated with mitotic-origin aneuploidy in human embryos. *Science*, 348(6231): 235–238. DOI: [10.1126/science.aaa3337](https://doi.org/10.1126/science.aaa3337)
- 2014 Ahola, V., Lehtonen, R., Somervou, P., ..., **McCoy, R. C.** (18/45) , ..., Hanski, I. (2014), The Glanville fritillary genome retains an ancient karyotype and reveals selective chromosomal fusions in Lepidoptera. *Nature Communications*, 5. DOI: [10.1038/ncomms5737](https://doi.org/10.1038/ncomms5737)
- 2014 **McCoy, R. C.**, Taylor, R., Blauwkamp, T. A., Kelley, J. L., Kertesz, M., Pushkarev, D., Petrov, D. A., Fiston-Lavier, A. S. (2014), Illumina TruSeq synthetic long reads empower *de novo* assembly and resolve complex, highly repetitive transposable elements. *PLoS ONE*, 9(9): e106689. DOI: [10.1371/journal.pone.0106689](https://doi.org/10.1371/journal.pone.0106689)

- 2014 McCoy, R. C., Garud, N. R., Kelley, J. L., Boggs, C. L., Petrov, D. A. (2014), Genomic inference accurately predicts the timing and severity of a recent bottleneck in a non-model insect population. *Molecular Ecology*, 23(1): 136–150. DOI: [10.1111/mec.12591](https://doi.org/10.1111/mec.12591)

EDITORIALS AND COMMENTARIES

- 2019 Yan, S. M., McCoy, R. C. (2019), Functional divergence among hominins. *Nature Ecology & Evolution*, 3: 1507–1508. DOI: [10.1038/s41559-019-0995-y](https://doi.org/10.1038/s41559-019-0995-y)
- 2019 McCoy, R. C., Kort, J. D. (2019), Quantifying the transcriptional impacts of aneuploidy in human blastocysts. *Fertility & Sterility*, 111(5): 888–889. DOI: [10.1016/j.fertnstert.2019.02.126](https://doi.org/10.1016/j.fertnstert.2019.02.126)
- 2017 McCoy, R. C., Akey, J. M. (2017), Selection plays the hand it was dealt: evidence that human adaptation commonly targets standing genetic variation. *Genome Biology*, 18: 139. DOI: [10.1186/s13059-017-1280-5](https://doi.org/10.1186/s13059-017-1280-5)
- 2017 Adashi, E. Y., McCoy, R. C. (2017), Technology versus biology: the limits of pre-implantation genetic screening. *EMBO Reports*: e201743941. DOI: [10.15252/embr.201743941](https://doi.org/10.15252/embr.201743941)
- 2016 McCoy, R. C., Akey, J. M. (2016), Patterns of deleterious variation between human populations reveal an unbalanced load. *Proceedings of the National Academy of Sciences USA*, 113(4): 809–811. DOI: [10.1073/pnas.1524016113](https://doi.org/10.1073/pnas.1524016113)

NON-ACADEMIC ARTICLES

- 2015 McCoy, R. C., Petrov, D. A. (April 15, 2015), Chromosome errors cause many pregnancies to end before they are even detected., *The Conversation*, URL: <http://goo.gl/RBCdYv>
- 2013 McCoy, R. C. (November 26, 2013), Genomic analyses of ancestry of Caribbean populations., *CEHG Blog*, URL: <http://goo.gl/8ALT8P>

ORAL PRESENTATIONS

- Nov. 2020 World Congress on Controversies in Obstetrics, Gynecology and Infertility, Berlin, Germany
- *2020 Department of Molecular and Cellular Biology, Harvard University, Cambridge, MA
- 2020 Department of Embryology, Carnegie Institution, Baltimore, MD
- 2020 Computational Biology Department, Carnegie Mellon University, Pittsburgh, PA
- 2020 CReATe Fertility Centre, Toronto, Canada
- 2019 Annual Conference of the Foundation for Reproductive Medicine, New York, NY
- 2019 Origins of Human Aneuploidy Meeting, Paris, France
- 2019 Annual Meeting of the American Society of Human Genetics, Houston, TX
- 2019 Department of Genetics, Rutgers University, Piscataway, NJ
- 2019 Department of Biology, Catholic University, Washington, DC
- 2018 Annual Conference of the Foundation for Reproductive Medicine, New York, NY
- 2018 Annual Genomics & Bioinformatics Symposium, Johns Hopkins University, Baltimore, MD

2018 Johns Hopkins University Graduate Program in Cell, Molecular, Developmental Biology, and Biophysics Retreat, Rocky Gap State Park, MD

2018 Origins of Human Aneuploidy Meeting, Toronto, Canada

2017 Marabou Symposium on Nutrition and Human Development, Stockholm, Sweden

2017 1st Origins of Human Aneuploidy Meeting, Barcelona, Spain

2017 Combi Seminar, University of Washington, Seattle, WA

2017 Annual International Conference on Preimplantation Genetics, Valencia, Spain

2016 Genotype-Tissue Expression (GTEx) Project Community Meeting, Stanford, CA

2015 Annual Meeting of the American Society of Human Genetics, Baltimore, MD

2014 Bay Area Population Genomics Meeting, University of California, Davis, CA

2014 Illumina Long-Reads Applications Symposium, University of California, Davis, CA

2014 Ecology and Evolution Lunch Seminar, Stanford, CA

2014 Presentation to Management Team at Natera, Inc., San Carlos, CA

POSTER PRESENTATIONS

*2020 Society for Molecular Biology & Evolution, Québec City, Canada

*2020 The Allied Genetics Conference, Genetics Society of America

2019 Society for Molecular Biology & Evolution, Manchester, England

2017 67th Annual Meeting of the American Society of Human Genetics, Orlando, FL

2017 NHGRI Annual Training and Career Development Meeting, St. Louis, MO

2016 66th Annual Meeting of the American Society of Human Genetics, Vancouver, Canada

2016 NHGRI Annual Training and Career Development Meeting, Bethesda, MD

2014 Bay Area Population Genomics Meeting, University of California, Davis, CA

2014 Stanford Biosciences Student Association Poster Session, Stanford, CA

2014 Society for Molecular Biology & Evolution, San Juan, Puerto Rico [1/2]

2014 Society for Molecular Biology & Evolution, San Juan, Puerto Rico [2/2]

2014 Ctr. for Computational, Evolutionary, and Human Genomics Symposium, Palo Alto, CA

2013 Bay Area Population Genomics Meeting, Stanford, CA

2013 Annual Meeting of the Society for Integrative & Comparative Biology, San Francisco, CA

2012 Arthropod Genomics Symposium, Kansas City, MO

2012 1st Joint Congress on Evolutionary Biology, Ottawa, Canada

*Postponed or cancelled due to COVID-19

Teaching

2020 Instructor, Human Genome Variation (020.319, Fall), Johns Hopkins University

2020 Instructor, Quantitative Biology Lab (020.321, Fall), Johns Hopkins University

2020 Instructor, Quantitative Biology Bootcamp (020.321, Fall), Johns Hopkins University

2020 Instructor, Human Genome Variation Module: Analysis of Genomic Data (020.321, Spring), Johns Hopkins University

2020 Guest Lecturer, Human Genome Variation (020.319, Spring), Johns Hopkins University

- 2019 Guest Instructor, Quantitative Biology Bootcamp (020.607, Fall), Johns Hopkins University
- 2019 Guest Lecturer, Human Genome Variation (020.319, Spring), Johns Hopkins University
- 2019 Participant, Best Practices in University Teaching Workshop, Johns Hopkins University
- 2018 Mock F31 Review Panelist, Communicating Science (020.619, Spring), Johns Hopkins University
- 2018 Guest Lecturer, Quantitative Biology Bootcamp (020.607, Fall), Johns Hopkins University
- 2017–2018 Science Teaching Experience for Postdocs (STEP) Program, University of Washington
- 2017 Participant, Undergraduate Faculty Genetics Education Workshop, American Society of Human Genetics
- 2014 Teaching Assistant Mentor, Department of Biology, Stanford University
- 2013 & 2011 Teaching Assistant: Ecology, Evolution, and Plant Biology, Stanford University
- 2013 & 2012 Biocore Explorations Course Instructor, Department of Biology, Stanford University
- 2012 Teaching Assistant: Conservation Biology, Stanford University
- 2010 Undergraduate Workshop Leader: Evolution and Biodiversity, University of Miami
- 2009–2010 Peer Tutor, Camner Academic Resource Center, University of Miami

Research mentoring

POSTDOCTORATE

- 2020–Present Daniel Ariad, Postdoctoral Fellow, Johns Hopkins University

GRADUATE

- 2020–Present Kathryn Weaver, PhD Candidate in CMDB, Johns Hopkins University
- 2019–Present Stephanie Yan, PhD Candidate in CMDB, Johns Hopkins University
- 2020–Present Dylan Taylor, PhD Student in CMDB, Johns Hopkins University
- 2019–Present Sara Carioscia, PhD Student in CMDB, Johns Hopkins University
- 2018–2020 Arta Seyedian, Masters of Science Student in Bioinformatics, Johns Hopkins University
- 2020 Simon Zhang, PhD Rotation Student in CMDB, Johns Hopkins University
- 2019–2020 Sara Debic, PhD Rotation Student in CMDB, Johns Hopkins University
- 2019 Natalie Murphy, PhD Rotation Student in CMDB, Johns Hopkins University
- 2018–2019 Margaret Starostik, PhD Rotation Student in CMDB, Johns Hopkins University
- 2018 Katie Farney, PhD Rotation Student in CMDB, NIH-JHU Graduate Partnership Program

UNDERGRADUATE

- 2018–Present Peter Huang, Bachelor of Science Student in Biology, Johns Hopkins University
- 2018–Present Joel Espinoza, Bachelor of Science Student in Biology, Johns Hopkins University
- 2019–2020 Nicholas Parente, Bachelor of Science Student in Applied Mathematics & Statistics and Computer Science, Johns Hopkins University
- 2018 Vincent Huang, Bachelor of Science Student in Biology, Johns Hopkins University

2014–2015 Jack McGregor, Senior Honors Thesis (Co-Advised), Stanford University

HIGH SCHOOL

2020–Present Miles Fancher, Ingenuity Project, Baltimore Polytechnic Institute, Baltimore, MD

2020–Present Aram Zaproshyan, Ingenuity Project, Baltimore Polytechnic Institute, Baltimore, MD

Academic, community, & university service

DOCTORAL THESIS COMMITTEES

2020–Present Margaret Starostik, CMDB, Johns Hopkins University

GRADUATE BOARD ORAL (GBO) EXAMINATION COMMITTEES

Sept. 2020 Justin Mirazee, NIH/JHU Graduate Partnership Program

DEPARTMENTAL COMMITTEES

2020–Present Undergraduate Curriculum Committee, Department of Biology, Johns Hopkins University

2019 CMDB Thesis Award Committee, Department of Biology, Johns Hopkins University

2012 PhD Interview Visit Committee, Department of Biology, Stanford University

2011 New PhD Student Orientation Committee, Department of Biology, Stanford University

CONFERENCES

2019 Pre-Conference Workshop Chair, Annual Conference of the Foundation for Reproductive Medicine, New York, NY

2019 Session Moderator, Reproductive Fitness - The Genetics of Infertility, 69th Annual Meeting of the American Society of Human Genetics, Houston, TX

2017 Session Moderator, Detection and Interpretation of Structural Variation, 67th Annual Meeting of the American Society of Human Genetics, Orlando, FL

PEER REVIEW

2013–Present Ad Hoc Reviewer, *BioData Mining*, *Bioinformatics*, *Cell Proliferation*, *Current Urology*, *Genes*, *Genetics*, *Genome Biology and Evolution*, *Journal of Assisted Reproduction & Genetics*, *Journal of Biogeography*, *Journal of Heredity*, *Journal of Ovarian Research*, *Molecular Ecology*, *Nature Communications*, *Nature Ecology & Evolution*, *PLoS Biology*, *PLoS Genetics*, *PLoS One*, *Proceedings of the Royal Society B*, *Reproduction*, *Science*, *Science Advances*

2018–2019 Outside Reviewer, Biological Anthropology Program, National Science Foundation

EDUCATION, VOLUNTEERING, & OUTREACH

- 2020 Representative of JHU CMDB, NIH Virtual Graduate & Professional School Fair
- 2020 Visiting Fellow in Biology Assessment, AP Higher Education, The College Board
- 2019 Undergraduate Mentor, Society for Molecular Biology & Evolution, Manchester, England
- 2018–2019 Senior Project Mentor, School Without Walls, Washington, DC
- 2018 Bioethics Panelist, Biology Club, Univ. of Maryland, Baltimore County, Catonsville, MD
- 2018 & 2017 Education Outreach Volunteer, University Prep Middle School, Seattle, WA
- 2018 Judge, NWABR Middle School Essay Contest, Seattle, WA
- 2017 Invited Speaker, Emerald City Rotary, Seattle, WA
- 2016 Volunteer, University of Washington Paws-On Science, Pacific Science Center, Seattle, WA
- 2016 Invited Speaker, Open Mic Science, Treehouse Cafe, Bainbridge Island, WA
- 2014 AP Biology E-mentor, Arroyo High School, San Lorenzo, CA
- 2012–2013 Copy Editor, *Six Degrees: The Stanford Journal of Human Rights*
- 2012 Judge, Synopsys Silicon Valley Science and Technology Championship, San Jose, CA