

Brooke Nichole Wolford

PhD Candidate in Bioinformatics

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EDUCATION

- Sept. 2015-Present **University of Michigan** Ann Arbor, MI
Program in Biomedical Sciences, Department of Computational Medicine & Bioinformatics
Doctor of Philosophy, Bioinformatics & Master of Arts, Statistics, Cumulative GPA: 3.85
- Aug. 2009-May 2013 **University of North Carolina at Chapel Hill** Chapel Hill, NC
Bachelor of Science, Quantitative Biology
Highest Honors and Highest Distinction, Cumulative GPA: 3.9
- Aug. 2007-July 2009 **North Carolina School of Science and Mathematics** Durham, NC
High School Diploma

RESEARCH EXPERIENCE

- Sept. 2016-Present **Cristen J. Willer Group** Ann Arbor, MI
University of Michigan Medical School
Departments of Internal Medicine, Human Genetics, & Computational Medicine & Bioinformatics
Graduate Student
Statistical methods development to improve genetic discovery and precision medicine approaches with the use of family history information in population biobanks.
- Sept. 2016-Present **Michael Boehnke Group** Ann Arbor, MI
University of Michigan School of Public Health
Department of Biostatistics & Center for Statistical Genetics
Graduate Student
- March-April 2016 **David Ginsburg Laboratory** Ann Arbor, MI
University of Michigan, Department of Human Genetics
Life Sciences Institute, Howard Hughes Medical Institute
Rotation student
Used bacteriophage display and high throughput sequencing to explore hemostatic protease biochemistry.
- Aug. 2013-Aug. 2015 **Francis S. Collins Laboratory** Bethesda, MD
National Institutes of Health, National Human Genome Research Institute
Medical Genomics and Metabolic Genetics Branch
Post-baccalaureate Intramural Training Award Program Trainee
Performed integrative analyses to understand genetic, epigenetic, and regulatory variation in Type 2 Diabetes as part of the FUSION project. Computationally studied allelic bias in high-throughput sequencing data using a combination of bash, Perl, and R on a high-performance compute cluster.
- June 2008-May 2013 **Corbin D. Jones Laboratory** Chapel Hill, NC
University of North Carolina at Chapel Hill, Biology Department
Undergraduate Research Assistant (August 2009 - May 2013)
Volunteer Research Assistant (June 2008, Spring 2009, June 2009)
Honors thesis: Evolutionary Development of Gain-of-Function Stripes in *Z. indianus*
Studied the molecular and genetic basis of adaptive evolution in *Drosophila* and related species with behavioral assays, phenotypic studies, and molecular analysis. Collaborated with Dr. Jones to perform an RNAi assay on olfactory and gustatory behavior in *D. melanogaster* through a Research Experience course at North Carolina School of Science and Mathematics and as a summer volunteer.

HONORS & AWARDS

- Sept. 2019 Univ. of Michigan Program in Biomedical Sciences 20th Anniversary Graduate Student Award for Excellence in Research, Teaching, Service, and Promotion of Diversity, Equity, and Inclusion
- Dec. 2018 Department of Computational Medicine & Bioinformatics Annual Student Service Award

July 2018	Univ. of Michigan OGPS Excellence in Service Award Bioinformatics Graduate Program Nominee
April 2016	National Science Foundation Graduate Research Fellowship Program Fellow
March 2016	Genome Sciences Training Program (NIH T32) Fellow
Sept. 2015	Univ. of Michigan Benard L. Maas Fellowship Award
April 2015	National Science Foundation Graduate Research Fellowship Program Honorable Mention
Dec. 2014	NHGRI Symposium Best Traditional Scientific Poster Award
May 2014	NIH Post-baccalaureate Poster Day Outstanding Poster Award
Fall 2012	Phi Beta Kappa National Honor Society
Spring 2012	Goldwater Scholarship UNC-CH Nominee
2010-2011	SEANC Statewide Merit Scholarship
2009-2010	SEANC District 17 Merit Scholarship

GRANTS

2017, 2018, 2019	Rackham Conference Travel Grant (\$800)
April 2018	Rackham Professional Development Grant (\$400)
April 2018	Univ. of Washington Summer Inst. in Statistical Genetics Registration & Travel Scholarship (\$1,400)
Oct. 2017	Benard L. Maas Professional Development Award (\$500)
May 2017	Rackham Conference Travel Grant (\$800)
July 2014	NIH Intramural Sequencing Center Pilot Project (\$10,000)
	Cell-type specific epigenome and transcriptome signatures of alpha and beta cells in rat islets
May 2013	Tom and Elizabeth Long Research Award (\$500)
	"Evolutionary Development of Gain of Function stripes in <i>Zaprionus indianus</i> "
Summer 2012	UNC OUR Summer Undergraduate Research Fellowship (\$3,000)
	"Evolutionary Development of 'Racing Stripes' in <i>Zaprionus indianus</i> "
Spring 2009	Steffee Endowment for Student Research and Creativity (\$200)
	"Behavioral Effects of RNA interference in <i>Drosophila melanogaster</i> "

PUBLICATIONS

1. **Wolford BN***, Hornsby WE*, [19 authors], Milewicz DM, Willer CJ, Yang B. Clinical implications of identifying pathogenic variants in individuals with thoracic aortic dissection. *Circulation Genomic and Precision Medicine* 12(6): 273-280. <https://doi.org/10.1161/CIRCGEN.118.002476>.
2. Nielsen JB, [17 authors], **Wolford BN**, [27 authors], Abecasis GR, Hveem K, Willer CJ. Biobank-driven genomic discovery yields new insight into atrial fibrillation biology. *Nature Genetics* 50:1234–39, 273-280. <https://doi.org/10.1038/s41588-018-0171-3>.
3. Zhou W, Nielsen JB, Fritsche LG, Dey R, Gabrielsen ME, **Wolford BN**, [10 authors], Abecasis GR, Willer CJ, Lee S. Efficiently controlling for case-control imbalance and sample relatedness in large-scale genetic association studies. *Nature Genetics* 50(9):1335–41, <https://doi.org/10.1038/s41588-018-0184-y>.
4. **Wolford BN**, Willer CJ, and Surakka I. Electronic health records: the next wave of complex disease genetics. *Human Molecular Genetics*, 27:R14-R21, <https://doi.org/10.1093/hmg/ddy081>.
5. Taylor DL, Knowles DA, Scott LJ, Ramirez AH, Casale FP, **Wolford BN**, [16 authors], Boehnke M, Birney E, Collins FS. Interactions between genetic variation and cellular environment in skeletal muscle gene expression. *PLoS ONE* 13(4): e0195788. <https://doi.org/10.1371/journal.pone.0195788>
6. Kycia I, **Wolford BN**, [16 authors], Collins FS, Parker SCJ, Stitzel ML. A common type 2 diabetes risk variant potentiates activity of an evolutionarily conserved islet stretch enhancer and increases C2CD4A and C2CD4B expression. *American Journal of Human Genetics* 102(4):620-635, <https://doi.org/10.1016/j.ajhg.2018.02.020>.
7. Nielsen JB, [8 authors], **Wolford BN**, [32 authors], Abecasis GR, Hveem K, Willer CJ. Genome-wide study of atrial fibrillation identifies seven risk loci and highlights biological pathways and regulatory elements involved in development. *American Journal of Human Genetics*, 102(1):103-115, <https://doi.org/10.1016/j.ajhg.2017.12.003>
8. Roman TS, Cannon ME, Vadlamudi S, Buchokovich ML, **Wolford BN**, [14 authors], Parker SCJ, Stitzel ML, Mohlke K. A type 2 diabetes-associated functional regulatory variant in a pancreatic islet enhancer at the ADCY5 locus. *Diabetes* 66(9):2521-2530, doi:10.2337/db17-0464.
9. Varshney, A, [7 authors], **Wolford BN**, [12 authors], Collins FS, Parker SCJ, Stitzel ML. Genetic regulatory signatures underlying islet gene expression and type 2 diabetes. *Proceedings of the National Academy of Sciences* 114(9):2301-2306, <https://doi.org/10.1073/pnas.1621192114>.

10. Scott LJ, Erdos MR, Huyghe JR, Welch RP, Beck AT, **Wolford BN**, [23 authors], Boehnke M, Collins FS, Parker SCJ. The genetic regulatory signature of type 2 diabetes in human skeletal muscle. *Nature Communications* 7, 11764, <https://doi.org/10.1038/ncomms11764>.
11. Earley EJ and **Wolford BN**. Mechanosensation across and within *Drosophila* species. *Drosophila Information Services* 2009, 92:119-122.

PRESENTATIONS

Clinical implications of identifying pathogenic variants in individuals with thoracic aortic dissection

1. American Society of Human Genetics Annual Meeting | poster presentation | San Diego, CA | October 2018
2. 6th Human Genetics in NYC | poster presentation | New York, NY | October 2018

Using EHR-linked biobanks to study the genetics of cardiometabolic diseases

3. Norwegian University of Science & Technology, Department of Public Health & Nursing | invited seminar | Trondheim, Norway | September 2018

Using genotyped relatives of ungenotyped type 2 diabetes cases as proxy-cases in a cohort based GWAS

4. James V. Neel Lectureship Symposium | poster presentation | Ann Arbor, MI | May 2018
5. Gilbert S. Omenn Lectureship Symposium | poster presentation | Ann Arbor, MI | March 2018
6. American Society of Human Genetics Annual Meeting | platform presentation | Orlando, FL | October 2017
7. Biomedical Statistical Modeling | poster presentation | Ann Arbor, MI | June 2017
8. CSHL Conference on The Biology of Genomes | poster presentation | Cold Spring Harbor, NY | May 2017
9. James V. Neel Lectureship Symposium | poster presentation | Ann Arbor, MI | May 2017
10. NHGRI Research Training & Career Development Annual Meeting | poster presentation | St. Louis, MO | April 2017

Type 2 diabetes genome wide association study by proxy in the Nord-Trøndelag Health Study

11. Dept of Bioinformatics and Computational Biology Retreat | poster presentation | Ann Arbor, MI | October 2016
12. Genome Sciences Training Program New Student Orientation | oral presentation | Ann Arbor, MI | September 2016

Allelic transcriptome signatures identify disease-relevant regulatory architecture in diabetes relevant cell-types

13. James V. Neel Lectureship Symposium | poster presentation | Ann Arbor, MI | May 2016

Allelic transcriptomic and epigenomic signatures in diabetes relevant cell-types

14. Collins Laboratory Quadrennial Review and Site Visit | poster presentation | Bethesda, MD | September 2015
15. Integrated 3-D epigenomic and transcriptomic analysis of the *EndoC-BH1* human pancreatic islet beta cell model
16. CSHL Conference on The Biology of Genomes | poster presentation | Cold Spring Harbor, NY | May 2015
17. NIH Post-baccalaureate Poster Day | poster presentation | Bethesda, MD | April 2015

Allele Specific Expression Quantitative Trait Loci in Muscle RNA-seq

18. NIH Bioinformatics Special Interest Group Lightning Talk | oral presentation | Bethesda, MD | March 2014

Allelic transcription and enhancer signatures in diabetes relevant cells

19. NHGRI Scientific Symposium | poster presentation | Bethesda, MD | December 2014
20. NIH Post-baccalaureate Poster Day | poster presentation | Bethesda, MD | May 2014
21. NIH Bioinformatics Special Interest Group Poster Session | poster presentation | Bethesda, MD | May 2014

Allele Specific Expression Quantitative Trait Loci in Diabetes Relevant Cells

22. NIH Post-baccalaureate Seminar Series | oral presentation | Bethesda, MD | October 2014

*Evolutionary development of gain-of-function stripes in *Zaprionus indianus**

23. Celebration of Undergraduate Research | oral presentation | Chapel Hill, NC | April 2013
24. John K. Koeppe Biology Undergraduate Research Symposium | oral presentation | Chapel Hill, NC | March 2013

SCIENTIFIC SERVICE

2019-2020	Bioinformatics Graduate Program Peer Mentor
February 2019	UM Undergraduate Research Opportunity Program (UROP) Panelist
Nov. 2016-Present	Girls Who Code at UM DCMB Co-founder & Executive Committee Co-chair
March 2018	Forsythe Middle School Young Scientists' Expo Judge
Jan. 2017-Dec. 2018	ASHG Trainee Newsletter 'The Nascent Transcript' Contributor
April 2016-Present	MiSciWriters Contributor
March 2017, 2018	ASHG DNA Day Essay Judge
November 2016	Speaker at Minding the Gap: Gap Year Experiences for STEM Students sponsored by UM WISE
Mar. 2016-May 2018	Activities Facilitator & Scouts Assistant at Ann Arbor Hands on Museum
July 2015	Research Group Host for NIH High School Scientific Training and Enrichment Program (HiSTEP)
Aug. 2014-July 2015	Contributor for NHGRI Communication & Science Policy Group's Genome Advance of the Month
March 2014-July 2015	Member of Genome Trainee Advisory Committee (GTAC) for NHGRI/NIH

April 2014 Volunteer for NHGRI 'Fun With DNA' during NIH Take Your Child To Work Day
 April-Aug. 2014 Volunteer for Smithsonian National Museum of Natural History Genome Zone
 Sept. 2012-May 2013 Summer Undergraduate Research Fellowship Peer Advisor for UNC Office of Undergrad. Research

TEACHING EXPERIENCE

Summer 2019 Big Data Summer Institute (Summer Institute in Biostatistics program) Graduate Student Instructor
 July 2019 Data Science Summer Experience in Detroit hosted by Girls Who Code at UM DCMB Facilitator
 July 2018, 2019 Summer Bridge Scholars Program, Genetics and Genomics Campus Connection Instructor
 May 2019 Genetic Epidemiology (SMED 8020, Norwegian Univ. of Science & Technology) Guest Lecturer
 April 2019 Skype A Scientist Speaker
 April 2018, 2019 Genomics in Epidemiology (EPID 516) Guest Lecturer
 March 2019 Graduate Society of Black Scientists and Engineers Intro to Python Workshop Instructor
 Nov.2016-Mar. 2019 Females Excelling More in Math, Engineering & the Sciences Semester Capstone Activity Leader
 December 2018 South Asheboro Middle School's Biotech Careers Guest Scientist
 Fall 2018 Tutor for Molecular Genetics (HUMGEN 541)
 Sept. 2017-Present Girls Who Code at UM DCMB Club Facilitator
 May 2018 New Hope Elementary School's 2nd grade Guest Scientist and Genetics Lesson Instructor
 May 2018 Association of Multicultural Scientists Science Career Day Coding & Robotics Instructor
 April 2018 St. Thomas the Apostle Catholic School Science Olympiad Team Field Trip Speaker
 April 2018 Michigan DNA Day Ambassador
 March 2018 Forsythe Middle School Young Scientists' Expo Demonstration Leader
 2016- 2018 Annual Introductory Genetics & Thoracic Aortic Aneurysm Lecture Genetics for UM CHIP Biobank
 June 2017, July 2018 Michigan Heath Science Pre-College Exposure Academy Graduate Student Instructor
 April – June 2017 St. Thomas the Apostle Catholic School Science Olympiad ("Gene-ius" event) Assistant Instructor
 March 2017 Liberty Elementary School's 5th grade Guest Scientist and Genetics Lesson Instructor
 November 2015 Females Excelling More in Math, Engineering, and Science (FEMMES) Fall Capstone Volunteer
 August 2015 Girl Scout Troop 40004's STEM badge Guest Speaker

LEADERSHIP & COMMUNITY INVOLVEMENT

May 2016-July 2018	UNC General Alumni Association's Ann Arbor Carolina Club Chair	Ann Arbor, MI
May 2016-April 2018	Wesley Foundation at the University of Michigan Community Coordinator (May – Sept. 2016) Loud Lecture Committee Member (April 2016 –April 2018)	Ann Arbor, MI
June 2014-July 2015	Montgomery Hospice Respite and Companionship Visitor	Rockville, MD
Summer 2010 – 2013	Quaker Lake Camp Health and Safety Director (2010, 2011, 2013) Seeds Environmental Education Program Coordinator (2012, 2013)	Climax, NC
June 2011-May 2013	Orange & Chatham County Judicial System Guardian ad Litem	Chapel Hill, NC

SKILLS

Bioinformatics: Perl, Python, R, Bash, C/C++; analysis of RNA-seq, ChIP-seq, ATAC-seq and genotyping data; use of high performance compute cluster; use of internet databases such as UCSC Genome Browser
 Molecular biology: DNA extraction, PCR, RT-PCR, restriction digest, Illumina library preparation, bacteriophage display
 Laboratory: fruit fly husbandry and behavioral assays, EMS mutagenesis, Scanning Electron Microscopy
 Computing: Adobe Photoshop, Adobe Illustrator, Dendroscope, Apple and Microsoft Operating Systems

CONTINUING EDUCATION

August 2019 Leena Peltonen School of Human Genomics
Health 2030 Genome Center, Switzerland
 July 2018 23rd Summer Institutes in Statistical Genetics
Modules: Adv. Quantitative Genetics, Statistical & Quantitative Genetics of Disease
University of Washington Department of Biostatistics
 April 2018 Jorge Cham Workshop: Communicating Your Research to a General Audience
University of Michigan
 May 2017 Stand Up for Science: Practical Approaches to Discussing Science that Matters
University of Michigan Teach-Out via edX

Jan.-May 2015	Demystifying Medicine <i>National Institutes of Health Office of Intramural Research</i>
Sept.-Dec. 2014	Genetic Counseling Professional Topics Seminar <i>Foundation for Advanced Education in the Sciences (3 credits)</i>
Sept. 2014-May 2015	NIH Academy Certificate Program <i>National Institutes of Health (Certificate of Completion)</i>
Summer 2014	Exploring the World of Big Data with Computational Genomics Journal Club <i>National Institutes of Health Office of Intramural Training and Education</i>
Spring 2014	Current Topics in Genome Analysis <i>National Human Genome Research Institute Division of Intramural Research</i>
March 2014	Writing and Publishing a Scientific Paper <i>National Institutes of Health Office of Intramural Training and Education (Certificate of Training)</i>
October 2013	Computing for Data Analysis <i>Coursera partnership with JHU Bloomberg School of Public Health (Statement of Accomplishment)</i>