

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

- 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

July 2018	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. CSHL Conference on The Biology of Genomes | poster presentation | Cold Spring Harbor, NY | May 2015
16. NIH Post-baccalaureate Poster Day | poster presentation | Bethesda, MD | April 2015

Allele Specific Expression Quantitative Trait Loci in Muscle RNA-seq

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

Allelic transcription and enhancer signatures in diabetes relevant cells

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

Allele Specific Expression Quantitative Trait Loci in Diabetes Relevant Cells

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

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

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

SCIENTIFIC SERVICE

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|----------------------|---|
| 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
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 2 nd 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 5 th 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
July 2018	23 rd Summer Institutes in Statistical Genetics Modules: Adv. Quantitative Genetics, Statistical & Quantitative Genetics of Disease <i>University of Washington Department of Biostatistics</i>
April 2018	Jorge Cham Workshop: Communicating Your Research to a General Audience <i>University of Michigan</i>
May 2017	Stand Up for Science: Practical Approaches to Discussing Science that Matters <i>University of Michigan Teach-Out via edX</i>
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
National Institutes of Health (Certificate of Completion)

Summer 2014 Exploring the World of Big Data with Computational Genomics Journal Club
National Institutes of Health Office of Intramural Training and Education

Spring 2014 Current Topics in Genome Analysis
National Human Genome Research Institute Division of Intramural Research

March 2014 Writing and Publishing a Scientific Paper
National Institutes of Health Office of Intramural Training and Education (Certificate of Training)

October 2013 Computing for Data Analysis
Coursera partnership with JHU Bloomberg School of Public Health (Statement of Accomplishment)