

Paul W. Hook

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Curriculum Vitae

EDUCATION

- Johns Hopkins School of Medicine**, Baltimore, MD 2014 – 2020
Ph.D., Human Genetics
Thesis title: *“Leveraging Mouse Genomic Data to Prioritize Genes and Variants Associated with Common, Complex Neurological Disease”*
- The Pennsylvania State University**, University Park, PA May 2012
B.S., Biochemistry and Molecular Biology

RESEARCH EXPERIENCE

- Postdoctoral Fellow** 2020 – Present
Whiting School of Engineering
Johns Hopkins University, Baltimore, MD
Advisor: Winston Timp
- Developing genomics approaches utilizing long-read sequencing to explore subjects including DNA methylation, protein-DNA binding, and information storage in DNA
- Graduate Student** 2014 – 2020
Johns Hopkins School of Medicine, Baltimore, MD
Advisor: Andrew McCallion
- Designed, performed, and analyzed RNA-seq and single-cell RNA-seq experiments on mouse dopaminergic neurons and established a scoring paradigm for prioritizing genes from Parkinson disease GWAS loci
 - Analyzed mouse chromatin data in order to identify cell populations relevant to neurological disease risk and to prioritize disease-relevant variation in disease-associated loci
- Research Technologist** 2012 – 2014
Johns Hopkins School of Medicine, Baltimore, MD
Advisor: Andrew McCallion
- Elucidated the functional consequences of disrupting genes on somitogenesis and heart development in zebrafish and implemented the use of Cas9 nuclease genome editing in zebrafish and human cell culture
- Science Undergraduate Laboratory Internship** Summer 2011
Department of Energy, Pacific Northwest National Laboratory, Sequim, WA
Advisor: Michael Huesemann
- Explored how temperature affects algal growth and algal lipid composition for the National Alliance for Advanced Biofuels and Bio-products team
- Chemical Research Intern** 2010 – 2011
The Pennsylvania State University, University Park, PA
Advisor: Joseph Keiser
- Adapted and developed experiments focused on exploring the biochemical components of peanuts for an undergraduate laboratory class
 - Assisted in designing and building demonstrations for undergraduate chemistry lectures

LEADERSHIP AND MENTORING**Research Mentoring (Graduate school)**

2014 – 2020

Trained graduate students (3) and research technicians (5) on various molecular biology techniques and techniques related to working with mice and zebrafish.

Research Mentoring (Postdoctoral Fellow)

2020 – Present

Trained and supervised undergraduate students (2) and research technicians (2), in various molecular biology techniques and data analysis. Also, worked directly with graduate students (6) and postdoctoral fellows (3) which included training them in wet-bench and computational techniques, planning and performing experiments, and writing and editing manuscripts, abstracts, and grants.

Membership Engagement Committee

2020 – 2023

The American Society of Human Genetics (ASHG)

Served on a committee of ASHG members (20+) working with ASHG staff to analyze what society members wanted from a membership and to increase the value of a membership. This involved frequent, virtual meetings and in-person meetings at ASHG annual conferences. A society-exclusive social media platform (ASHG Connect) and special interest groups (SIGs) grew out of this committee.

Shared Interest Group (SIG) Chair

2022 – Present

Bioinformatics and Computational Methods SIG

The American Society of Human Genetics (ASHG)

Worked with staff at ASHG to create and run the Bioinformatics and Computational Methods SIG. This has involved developing and executing inclusive strategies to maximize participation in the SIGs. Specific tasks included leading a webinar introducing the SIGs, leading conversations on the ASHG social media platform, ASHG Connect, and leading an in-person meet-up at the ASHG annual conference in 2023.

ASHG 2022 Annual Meeting Planning Advisory Group

2021-2022

The American Society of Human Genetics (ASHG)

Provided advice and counsel to ASHG staff as they planned the first, in-person, post-pandemic, ASHG annual conference.

Career panel

July 14, 2022

NIH Advanced Genomic Technology Development (AGTD) Annual Meeting

Represented postdoctoral fellows on a career panel meant to discuss career options and provide advice on how to prepare and pursue different career paths.

Planning Committee

2021-2022, 2023-2024

NIH Advanced Genomic Technology Development (AGTD) Annual Meeting

Worked with the organizers of the AGTD annual meeting to review abstracts, organize sessions, and plan activities during the meeting.

Student Faculty Representative

2016 – 2020

Human Genetics Pre-Doctoral Training Program

Johns Hopkins University School of Medicine, Baltimore, MD

Served as a representative to program leadership for the students in the Human Genetics graduate program. This involved regular meetings with the program's director and board as well advocating on behalf of students and bringing student issues to program leadership when necessary.

Peer Mentoring Leader

2017 – 2020

Institute of Genetic Medicine Peer Mentoring Families

Johns Hopkins University School of Medicine, Baltimore, MD

Served as the head of Human Genetics peer mentoring “family.” This involved mentoring a small group of students (between 5-10 at any given time) at all stages of graduate school from newly accepted students to those close to graduating. As head of the “family,” I would periodically organize small events for the entire group and have one-on-one conversations with various family members.

PROFESSIONAL ASSOCIATIONS

The American Society of Human Genetics

2015 - Present

TEACHING EXPERIENCE

Lab tour and strawberry DNA extraction demonstration

March 23, 2023

Galaxy Team Meeting 2023

Johns Hopkins University, Baltimore, MD

Teaching Assistant

Fall 2016

Evolution of Ideas in Human Genetics

Johns Hopkins University School of Medicine, Baltimore, MD

Presenter

November 14, 2015

The Genome Geeks Are In

Smithsonian National Museum of Natural History, Washington, DC

Peer Learning Assistant

Fall 2011

BMB 430: Developmental Biology

The Pennsylvania State University, University Park, PA

PREPRINTS AND PEER-REVIEWED PUBLICATIONS

Volkel, K.D., Lin, K.N., **Hook, P.W.**, Timp, W., Keung, A.J., and Tuck, J.M (2023). FramedD: framework for DNA-based data storage design, verification, and validation. *Bioinformatics*, Volume 39, Issue 10, October 2023, btad572, <https://doi.org/10.1093/bioinformatics/btad572>

Rhie, A., Nurk, S., Cechova, M., Hoyt, S.J., Taylor, D.J., Altemose, N., **Hook, P.W.**, Koren, S., Rautiainen, M., Alexandrov, I.A., ..., Eichler, E.E, O'Neill, R., Schatz, M.C., Miga, K.H., Makova, K.D., and Phillippy, A.M. (2023). The complete sequence of a human Y chromosome. *Nature*, 1–11. <https://doi.org/10.1038/s41586-023-06457-y>.

Hook, P.W., and Timp, W. (2023). Beyond assembly: the increasing flexibility of single-molecule sequencing technology. *Nat. Rev. Genet.* 24, 627–641.

Boyd, R.J., McClymont, S.A., Barrientos, N.B., **Hook, P.W.**, Law, W.D., Rose, R.J., Waite, E.L., Rathinavelu, J., Avramopoulos, D., and McCallion, A.S. (2023). Evaluating the mouse neural precursor line, SN4741, as a suitable proxy for midbrain dopaminergic neurons. *BMC Genomics* 24, 306.

Razaghi, R., **Hook, P.W.**, Ou, S., Schatz, M. C., Hansen, K. D., Jain, M., & Timp, W. (2022). Modbamtools: Analysis of single-molecule epigenetic data for long-range profiling, heterogeneity, and clustering. *bioRxiv*, 2022.07.07.499188.

Gershman, A., Sauria, M.E.G., Guitart, X., Vollger, M.R., **Hook, P.W.**, Hoyt, S.J., Jain, M., Shumate, A., Razaghi, R., Koren, S., Altemose, N., Caldas, G.V., Logsdon, G.A., Rhie, A., Eichler, E.E., Schatz, M.C., O'Neill, R.J., Phillippy, A.M., Miga, K.H., & Timp, W. (2022). Epigenetic patterns in a complete human genome. *Science*, 376 (6588), eabj5089.

Soto-Beasley, A.I., Walton, R.L., Valentino, R.R., **Hook, P.W.**, Labbé, C., Heckman, M.G., Johnson, P.W., Goff, L.A., Uitti, R.J., McLean, P.J., Springer, W., McCallion, A.S., Wszolek, Z.K., & Ross, O.A. (2020). Screening non-MAPT genes of the Chr17q21 H1 haplotype in Parkinson's disease. *Parkinsonism & Related Disorders*, 78, 138–144.

Hook, P.W., & McCallion, A.S. (2020). Leveraging mouse chromatin data for heritability enrichment informs common disease architecture and reveals cortical layer contributions to schizophrenia. *Genome Research*, 30 (4): 528–39.

McClymont, S.A., **Hook, P.W.**, Soto, A.I., Reed, X., Law, W.D., Kerans, S.J., Waite, E.L., Briceno, N.J., Thole, J.F., Heckman, M.G., Diehl, N.N., Wszolek, Z.K., Moore, C.D., Zhu, H., Akiyama, J.A., Dickel, D.E., Visel, A., Pennacchio, L.A., Ross, O.A., Beer, M.A., McCallion, A.S. (2018). Parkinson Associated SNCA Enhancer Variants Revealed by Open Chromatin in Mouse Dopamine Neurons. *The American Journal of Human Genetics*, 103 (6), 874–892.

Hook, P.W., McClymont, S.A., Cannon, G.H., Law, W.D., Morton, A.J., Goff, L.A., & McCallion, A.S. (2018). Single-Cell RNA-Seq of Mouse Dopaminergic Neurons Informs Candidate Gene Selection for Sporadic Parkinson Disease. *The American Journal of Human Genetics*, 102 (3), 427–446.

Turner, T.N., Hormozdiari, F., Duyzend, M.H., McClymont, S.A., **Hook, P.W.**, Iossifov, I., ... Eichler, E.E. (2016). Genome Sequencing of Autism-Affected Families Reveals Disruption of Putative Noncoding Regulatory DNA. *The American Journal of Human Genetics*, 98 (1), 58–74.

Maragh, S., Miller, R.A., Bessling, S.L., Wang, G., **Hook, P.W.**, & McCallion, A.S. (2014). Rbm24a and Rbm24b are required for normal somitogenesis. *PLoS ONE*, 9 (8).

Van Wagenen, J., Miller, T.W., Hobbs, S., **Hook, P.**, Crowe, B., and Huesemann, M. (2012). Effects of light and temperature on fatty acid production in *Nannochloropsis salina*. *Energies* 5, 731–740.

PLATFORM AND INVITED TALKS

Hook, P.W. “Using CUT&RUN/Tag with a portable nanopore sequencing device.” NHGRI Genome Technology Development Working Group bi-monthly meeting. Virtual. December 6, 2023.

Hook, P.W. “Targeted long-read sequencing for interrogation of cancer genetic loci.” Association of Biomolecular Resources Facilities Annual Meeting, Palm Springs, CA, 2022.

Hook, P.W., McCallion, A.S. “Refining cell populations and fine-mapping variants for schizophrenia and bipolar disorder using mouse open chromatin profiles” The American Society of Human Genetics, Houston, TX, 2019.

Hook, P.W., McClymont S.A., Cannon, G.H., Law, W.D., Morton, A.J., Goff, L.A., McCallion, A.S. “Prioritizing genes for sporadic Parkinson disease using single-cell expression profiling of mouse dopaminergic neurons” 11th Leena Peltonen School of Human Genomics, Les Diablerets, Switzerland, 2018.

Hook, P.W., McClymont, S.A., Goff, L.A., McCallion, A.S. “RNA-seq analysis identifies phenotypic heterogeneity among *ex vivo* purified dopamine neurons and highlights their progressive temporal diversification” The American Society of Human Genetics, Vancouver, BC, Canada, 2016.

POSTER PRESENTATIONS

Hook, P.W., Timp, W. “Using CUT&RUN/Tag with a portable nanopore sequencing device.” The American Society of Human Genetics Annual Meeting, Washington, DC, 2023

Hook, P.W., Hosea, J.A., Morina, L.B., Ebenstein, Y., Simpson, J., Timp, W. “Measuring the epigenome with nanopore sequencing.” The Advances in Genomic Technology Development Annual Meeting, La Jolla, California, 2023.

Hook, P.W., Timp, W. “Protein-DNA interactions at the bench: CUT&RUN/Tag with nanopore sequencing.” The Advances in Genome Biology and Technology Annual Meeting, Hollywood, FL, 2023.

Hook, P.W., Krueger, F., Timp, W. “Adapting Enzymatic Methyl-seq (EM-seq) for long-read nanopore sequencing.” Nanopore Community Meeting, New York City, NY, 2022.

Hook, P.W., Krueger, F., Timp, W. “Adapting Enzymatic Methyl-seq (EM-seq) for long read sequencing.” The Advances in Genome Biology and Technology Annual Meeting, Orlando, FL, 2022.

HONORS AND AWARDS

ASHG/Charles J. Epstein Trainee Award for Excellence in Human Genetics Research – Semifinalist 2019
The American Society of Human Genetics - Houston, TX
“Refining cell populations and fine-mapping variants for schizophrenia and bipolar disorder using mouse open chromatin profiles”

C.W. Cotterman Award 2018
The American Society of Human Genetics – San Diego, CA
“Single-Cell RNA-Seq of Mouse Dopaminergic Neurons Informs Candidate Gene Selection for Sporadic Parkinson Disease”

Leena Peltonen School of Human Genomics Trainee Summer 2018
Les Diablerets, Switzerland

Graduated with Distinction May 2012
Eberly College of Science
The Pennsylvania State University, University Park, PA

Dean’s List 2008-2012
Eberly College of Science
The Pennsylvania State University, University Park, PA

Gail A. and Thomas G. Ernst Scholarship 2009 – 2011

Kimberly Clark Bright Futures Scholarship 2008 – 2012