Matt Niederhuber, PhD

I am a developmental and computational biologist with strong experience generating and analyzing large NGS datasets. I'm passionate about communicating science through writing and obsessing over data visualization.

Education

PhD - Genetics & Molecular Biology   2016 - 2023
University of North Carolina   *Chapel Hill, NC*

- NSF Graduate Research Fellow
- Thesis: "Fine-tuning Enhancer Activity in Development"

Certificate - Premedical Sciences   2011 - 2013
Columbia University   *New York, NY*

BA - English Literature   2006 - 2010
Kenyon College   *Gambier, OH*

Experience

Graduate Research Student   August 2016 - August 2023
Advisor: Dr. Daniel J. McKay   *University of North Carolina, Chapel Hill, NC*

- Led two projects that applied <u>FAIRE-seq</u>, <u>CUT&RUN</u>, <u>ChIP-seq</u>, and <u>RNA-seq</u> assays, in combination with traditional <u>genetics</u> and <u>confocal microscopy</u> to study the regulation of enhancer activity in *Drosophila* wing development
- Wrote custom code in <u>Python</u>, and <u>Bash</u> to process raw NGS data and manage distributed analysis pipelines in a <u>HPC</u> environment
- Wrote custom code in <u>R</u> to explore high-dimensional NGS datasets, perform differential analysis, and generate high-quality <u>data visualization</u>
- <u>Designed</u> and generated novel fluorescent reporters to improve temporal resolution of dynamic enhancer activity for an *in-vivo* RNAi screen
- Wrote custom code in <u>Python</u> to automate <u>image analysis</u> of RNAi-screen confocal imaging
- <u>Mentored</u> a number of undergraduate, graduate, and visiting students on standard genetics, microscopy, and wet lab techniques

Research Assistant II   June 2014 - July 2016
PI: Dr. Pamela A. Silver   *Harvard Medical School, Boston, MA*

- Led a project that studied the 3-D structure of the Cyanobacterial carboxysome using <u>super-resolution microscopy</u> for potential <u>synthetic biology</u> applications
- Contributed to a project that engineered a novel bacterial memory device that recorded exposure to an intestinal inflammation biomarker in mice, characterized the dose response of the memory circuit
- <u>Mentored</u> the 2015 Harvard undergraduate IGEM team, taught standard <u>molecular biology</u>, and <u>synthetic biology</u> methods

Research Assistant   June 2013 - June 2014
PI: Dr. Jerard Hurwitz   *Memorial Sloan Kettering Cancer Center, New York, NY*

- Hands-on experience with <u>cell culture</u>, and standard <u>protein biochemistry</u> methodologies

Skills

Programming: R, Python, Bash / UNIX command line, HTML

Computational and Software: NGS data processing and QC, image analysis, Snakemake, Git, Docker, ImageJ, Napari, Adobe Creative Suite, Microsoft Office

Wet lab: molecular cloning, protein biochemistry, cell culture, fluorescent microscopy, FAIRE-seq, CUT&RUN, NGS library preparation and QC, *Drosophila* genetics

Writing: Grant writing, technical writing, popular science writing and editing

Publications

Academic:

Niederhuber MJ, Leatham-Jensen M, McKay DJ. 2023. The SWI-SNF nucleosome remodeler constrains enhancer activity during *Drosophila* wing development. bioRxiv.

Niederhuber MJ, McKay DJ. 2021. Mechanisms underlying the control of dynamic regulatory element activity and chromatin accessibility during metamorphosis. COIS.

Nystrom SL*, **Niederhuber MJ***, McKay DJ. 2020. Expression of E93 provides an instructive cue to control dynamic enhancer activity and chromatin accessibility during development. Development. *equal contributors

Naydich AD, Nangle SN, Bues JJ, Trivedi D, Nissar N, Inniss MC, **Niederhuber MJ**, Way JC, Silver PA, Riglar DT. 2019. Synthetic gene circuits enable systems-level biosensor discovery at the host-microbe interface. mSystems.

Niederhuber MJ, Lambert TJ, Yapp C, Silver PA, Polka JK. 2017. Superresolution microscopy of the β-carboxysome reveals a homogeneous matrix. MBoC.

Uyehara CM, Nystrom SL, **Niederhuber MJ**, Leatham-Jensen M, Ma Y, Buttitta LA, McKay DJ. 2017.Hormone-dependent control of developmental timing through regulation of chromatin accessibility.Genes and Development. Genes and Development.

Riglar DT, Giessen TW, Baym M, Kerns JS, **Niederhuber MJ**, Bronson RT, Kotula JW, Gerber GK, Way JC, Silver PA. 2017. Engineered bacteria can function in the mammalian gut long-term as live diagnostics of inflammation. Nature Biotechnology.

Selected Popular:

AlphaFold Unlocks Protein Structure Prediction with Artificial Intelligence.
    UNC: The Pipettepen, 2021.

UNC Scientists Partner with Citizen Scientists to Map Earth's River Obstructions.
    UNC Institute for the Environment, 2019.

CUT&RUN: An Improved Method for Studying Protein-DNA Interactions.
    Addgene Blog, 2018.

Making Time Matter: How Hormone Pulses Direct Chromatin Accessibility During Development.
    Development: The Node, 2017.

Insecticidal Plants: The Tech and Safety of GM Bt Crops.
    Harvard University: Science in the News, 2015.

Yes, This Exists: A Biohacker Hotline.
    Popular Science, 2013. (out of print)