

CONTACT INFORMATION

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EDUCATION

The University of North Carolina at Chapel Hill, School of Medicine

Ph.D. in Bioinformatics and Computational Biology, expected 2023

Advisor: Douglas H. Phanstiel

Written exam: PASSED

Oral exam: TBD

The University of North Carolina at Chapel Hill, College of Arts and Sciences

B.S. in Biology and B.A. in Chemistry, 2012 – 2016

Cumulative GPA: 3.576

GRADUATE RESEARCH EXPERIENCE

Phanstiel Lab, Graduate Research Assistant

SPRING | 2019 – PRESENT

- Conducted multi-omic data analysis in collaboration with Greg Wang's lab to investigate the phase-separation-induced changes in chromosomal architecture in response to a carcinogenic fusion protein.
- Developed Lure: an online, interactive software application for designing and visualizing oligonucleotide probes for hybrid-capture Hi-C (<http://phanstiel-lab.med.unc.edu/lure>).

Dominguez Lab, Rotation Student

WINTER, 14 WEEKS | 2019

- Used computational and wet-lab techniques to explore the autoregulatory interactions between the intrinsically disordered, phase-separation domains of proteins and their precursor mRNA structures.

Vincent Lab, Rotation Student

FALL, 10 WEEKS | 2018

- Conducted statistical analysis of metastatic melanoma microarray data to determine prognostically favorable tumor microenvironments in metastatic brain melanoma patients.
- Assessed the efficacy of chitosan-IL12 and neoantigen-derived vaccine combination immunotherapy in a bladder cancer mouse model. Began building a computational model to investigate tumor cell survival dynamics.

PREVIOUS RESEARCH EXPERIENCE

Research Technician 2016-2018

Marsico Lung Institute/UNC Cystic Fibrosis Research Center

- Conducted several research projects under Robert Tarran, Ph.D.
- Generated, analyzed, and prepared data resulting in several publications.
- Designed, built, and managed an online e-liquid safety database in collaboration with *Deep Green Software* (<https://www.eliquidinfo.org>).
- Mentored undergraduate, graduate, and rotation students.
- Developed novel protocols for exposure of cultured cells to e-liquid aerosol.
- Performed a variety of specialized techniques including high-throughput screening, Ussing chambers, confocal microscopy, rodent surgery, and cell culture.

Undergraduate Researcher 2015-2016

The University of North Carolina at Chapel Hill

- Conducted independent research projects under Dr. Robert Tarran, Dr. Robert Fellner, and Dr. Tongde Wu.
- Investigated electrophysiological responses of primary airway epithelial cell cultures to treatments with peptide inhibitors.
- Used confocal microscopy to assess the ability for peptides to inhibit STORE-operated calcium release in HEK293 cells.

GRANTS & FUNDING

Bioinformatics & Computational Biology T32 Training Grant 07|2019 – 06|2020

Partial stipend, tuition and health insurance coverage

Graduate Student Transportation Grant SPRING|2019

\$1,000 Travel award

HONORS & AWARDS

Best Innovative Poster Idea Award 08|2021

BioC2021: Bioconductor Conference

NSF Honorable Mention 04|2020

Graduate Research Fellowships Program

Poster Presentation Award 09|2019

UNC Department of Genetics Retreat

1st Place Predoctoral Poster Award 05|2017

Visiting Pulmonary Scholars Symposium

Dean's List Academic Honors 08|2012 - 05|2016

Eight semesters

TEACHING & MENTORING

First Year Group (FYG) Peer Mentor

08|2019 - PRESENT

FYG peer mentors meet with first year UNC graduate students and advise students about choosing rotations, selecting dissertation labs, and on having a successful graduate student experience.

Teaching Assistant, BCB720: Introduction to Statistical Modeling

FALL|2019

Responsibilities include teaching a class introducing/reviewing R, latex, calculus, and linear algebra, holding regular office hours, and grading homework assignments.

Teacher for How to Learn to Code

SUMMER|2019

How to Learn to Code (HTLTC) is a student-led summer program designed to introduce the fundamentals of coding to biological researchers (students/postdocs/faculty/staff). HTLTC offers classes in beginning, and intermediate programming in both R and python.

Instructor for DNA Day

04|2019

DNA day commemorates the completion of the Human Genome Project in 2003 and the discovery of DNA structure in 1953. On DNA day, UNC sends graduate students, postdocs, faculty and staff to high schools around North Carolina to teach about genomic research.

ORAL PRESENTATIONS

BioC2021 Lightning Talk

2021

Virtual Conference

“Using nullranges::matchRanges() with BentoBox ”

TCORS Annual Retreat

2017

Rizzo Conference Center, UNC-Chapel Hill

“The Physio-Chemical Properties of E-liquids”

POSTER PRESENTATIONS

BioC2021: Bioconductor Conference

2021

Virtual Conference

“Covariate-matched null-hypothesis ranges with nullranges::matchRanges()”

CSHL: Epigenetics & Chromatin

2020

Virtual Conference

Attended – no poster presentation

UNC Department of Genetics Retreat

2019

Wilmington, NC

“Lure: A Probe Design Tool for Hybrid Capture Hi-C (Hi-C²)”

Keystone Symposium 3D Genome: Gene Regulation and Disease

2019

Banff, AB, Canada

“LURE: Automated probe design for Hybrid Capture Hi-C (Hi-C²)”

TCORS National Conference 2017
NIH Campus, Bethesda, MD

“Physio-chemical Properties of E-liquids as Biomarkers of Harm”

Visiting Pulmonary Scholars Symposium 2017
Friday Center, UNC-Chapel Hill
1st place in the predoctoral category

TCORS National Conference 2016
NIH Campus, Bethesda, MD

“Evaluating E-liquid Toxicity with an Open-source High-throughput Screening Method”

TCORS Annual Retreat 2016
Rizzo Conference Center, UNC-Chapel Hill

“Evaluating Toxicity and Electrophysiological Effects of E-liquids”

PUBLICATIONS

Nicole E. Kramer, **Eric S. Davis**, Craig D. Wenger, Erika M. Deoudes, Sarah M. Parker, Michael I. Love, Douglas H. Phanstiel. Plotgardener: Cultivating precise multi-panel figures in R. *Biorxiv*. 2021 09|2021

Jeong Hyun Ahn, **Eric S. Davis**, Timothy A. Daugird, Shuai Zhao, Ivana Quiroga, Jie Li, Aaron J. Storey, Yi-Hsuan Tsai, Daniel P. Keeley, Samuel G. Mackintosh, Ricky D. Edmondson, Stephanie D. Byrum, Alan J. Tackett, Deyou Zheng, Wesley R. Legant, Douglas H. Phanstiel, Gang Greg Wang. Phase separation drives aberrant chromatin looping and cancer development. *Nature*. 2021 06|2021

Ghosh A, Beyazcicek O, **Davis ES**, Onyenwoke RU, Tarran R. Cellular effects of nicotine salt-containing e-liquids. *J Appl Toxicol*. 2021 Mar;41(3):493-505. doi: 10.1002/jat.4060. Epub 2020 Oct 9. PMID: 33034066. 03|2021

Trembath DG, **Davis ES**, Rao S, Bradler E, Saada AF, Midkiff BR, Snively AC, Ewend MG, Collichio FA, Lee CB, Karachaliou GS, Ayvali F, Ollila DW, Krauze MT, Kirkwood JM, Vincent BG, Nikolaishvilli-Feinberg N, Moschos SJ. Brain Tumor Microenvironment and Angiogenesis in Melanoma Brain Metastases. *Front Oncol*. 2021 Jan 21;10:604213. doi: 10.3389/fonc.2020.604213. PMID: 33552976; PMCID: PMC7860978. 01|2021

Woodall M, Jacob J, Kalsi KK, Schroeder V, **Davis E**, Kenyon B, Khan I, Garnett JP, Tarran R, Baines DL. E-cigarette constituents propylene glycol and vegetable glycerin decrease glucose uptake and its metabolism in airway epithelial cells in vitro. *Am J Physiol Lung Cell Mol Physiol*. 2020 Dec 1;319(6):L957-L967. doi: 10.1152/ajplung.00123.2020. Epub 2020 Sep 30. PMID: 32996783; PMCID: PMC7792687. 09|2020

Patwardhan MN, Wenger CD, Davis ES , Phanstiel DH. Bedtoolsr: An R package for genomic data analysis and manipulation. <i>Journal of Open Source Software</i> , 4(44), 1742, https://doi.org/10.21105/joss.01742	12 2019
Min A, Deoudes E, Bond ML, Davis ES , Phanstiel DH. CoralP: Flexible visualization of the human phosphatome. <i>Journal of Open Source Software</i> , 4(44), 1837, https://doi.org/10.21105/joss.01837	12 2019
Ghosh A, Coakley RC, Mascenik T, Rowell TR, Davis ES , et al. Chronic E-Cigarette Exposure Alters the Human Bronchial Epithelial Proteome. <i>Am J Respir Crit Care Med</i> . 2018;198(1):67-76. doi: 10.1164/rccm.201710-2033OC	07 2018
Davis ES* , Sassano MF*, Keating JE, et al. Evaluation of e-liquid toxicity using an open-source high-throughput screening assay. <i>PLoS Biology</i> . 2018;16(3):e2003904. doi: 10.1371/journal.pbio.2003904	03 2018
Matson BC, Pierce SL, Espenschied ST, Holle E, Sweatt IH, Davis ES , et al. Adrenomedullin improves fertility and promotes pinopodes and cell junctions in the peri-implantation endometrium. <i>Biol Reprod</i> . 2017;97(3):466-477. doi: 10.1093/biolre/iox101	08 2017
Davis ES , Sassano MF, Goodell H, Tarran R. E-Liquid Autofluorescence can be used as a Marker of Vaping Deposition and Third-Hand Vape Exposure. <i>Scientific Reports</i> . 2017;7(1):7459. doi: 10.1038/s41598-017-07862-w	08 2017

GRADUATE COURSEWORK

FALL|2018

BCB 710 Bioinformatics Colloquium	P
BCB 715 Bioinformatics and Mathematics Modeling	H
BCB 716 Bioinformatics and Sequencing Analysis	P
BCB 720 Introduction to Statistical Modeling	H
BCB 722 Topics in Population Genetics	H

SPRING|2019

BCB 710 Bioinformatics Colloquium	P
BCB 717 Structural Bioinformatics	P
BCB 718 Computational Modeling Laboratory	P
BCB 785 Statistical Methods for Gene Expression Analysis	P
GNET 749 Practical RNA-Seq	H

FALL|2019

BCB 710 Bioinformatics Colloquium	P
BIOC 702 Advanced Topics in Chromatin and Epigenetics	H
COMP 410 Data Structures	H
INLS 641 Visual Analytics	H

BCB Written Exam | May 7-10, 2019

Dynamic Modeling A1	H
Dynamic Modeling A2	P

Evolutionary & Functional Genomics B1
Evolutionary & Functional Genomics B2
Quantitative Genetics C1

H
H
H

BBSP FIRST YEAR GROUP FACULTY CO-MENTORS

Ben Major benmajor@med.unc.edu
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REFERENCES

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