

CONTACT INFORMATION

Location: Chapel Hill, NC

Phone: (336) 688-4117

Email: ericscottdavis@outlook.com (personal); esdavis@live.unc.edu (UNC)

Website: <http://www.ericscottdavis.com>

GitHub: <https://github.com/EricSDavis>

LinkedIn Profile: <https://www.linkedin.com/pub/ericscottdavis>

EDUCATION

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

Ph.D. in Bioinformatics and Computational Biology, 2018-2023

Advisor: Douglas H. Phanstiel

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

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

GRADUATE RESEARCH EXPERIENCE

Phanstiel Lab, Graduate Research Assistant

SPRING | 2019 – PRESENT

- Developed the lab's computational infrastructure including data processing pipelines, data organization, and analytical methodology.
- Led and contributed to multiple research projects focused on understanding 3D chromatin structure, gene regulation, and human disease.
- Developed and contributed to several software packages for analyzing biological data including CORAL, Bedtoolsr, Lure, plotgardener, nullranges, and mariner.
- Collaborated with external research groups such as ENCODE, Bioconductor, Wang Lab, Calabrese Lab, Franco Lab, and the Love Lab.
- Presented research at major national and international conferences earning multiple awards.
- Directly mentored graduate students, postdocs, and visiting research professors.

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

Computational Office Hour 09|2022 – PRESENT
Informal and unstructured computational mentorship. We meet weekly for an hour at a local bar or café to discuss computational-oriented problems and how to solve them.

Leadership Team Member – Computational Biosciences Club 09|2021 – PRESENT
The Computational Biosciences Club (CBC) serves as an inclusive network of students centered around computational-first science. CBC connects students across programs by the methods and tools we use, rather than the biological topics we study. Our focus is to improve core computational skillsets, form a network for career development with academia and industry, and engage in outreach with our local community.

First Year Group (FYG) Peer Mentor 08|2019 – 04|2021
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

Keystone Symposia: Chromatin Architecture in Development and Human Health 2023

Victoria, BC, Canada
"Mariner: Explore the Hi-Cs"
Invited

Thurston Arthritis Research Day 2022
Friday Center, UNC-Chapel Hill
"3D chromatin structure in chondrocytes identifies putative osteoarthritis risk genes"

UNC Department of Genetics Annual Retreat 2022 2022
Wilmington, NC
"Mariner: Explore the Hi-Cs"

BioC2022 Workshop 2022
Seattle Children's Hospital, Seattle, WA.
"Nullranges: Modular Workflow For Overlap Enrichment"

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 Annual Retreat 2019 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 NIH Campus, Bethesda, MD “Evaluating E-liquid Toxicity with an Open-source High-throughput Screening Method”	2016
TCORS Annual Retreat Rizzo Conference Center, UNC-Chapel Hill “Evaluating Toxicity and Electrophysiological Effects of E-liquids”	2016

PUBLICATIONS

Eric S Davis, Wancen Mu, Stuart Lee, Mikhail G Dozmorov, Michael I Love, Douglas H Phanstiel, matchRanges: Generating null hypothesis genomic ranges via covariate-matched sampling, <i>Bioinformatics</i> , 2023;, btad197, https://doi.org/10.1093/bioinformatics/btad197	04 2023
Dozmorov, Mikhail G., Wancen Mu, Eric S. Davis, Stuart Lee, Timothy J. Triche Jr, Douglas H. Phanstiel, and Michael I. Love. 2022. “CTCF: An R/bioconductor Data Package of Human and Mouse CTCF Binding Sites.” <i>Bioinformatics Advances</i> 2 (1): vbac097.	12 2022
Ogata, Jonathan D., Wancen Mu, Eric S. Davis , Bingjie Xue, J. Chuck Harrell, Nathan C. Sheffield, Douglas H. Phanstiel, Michael I. Love, and Mikhail G. Dozmorov. 2022. “Excluderanges: Exclusion Sets for T2T-CHM13, GRCm39, and Other Genome Assemblies.” <i>bioRxiv</i> . https://doi.org/10.1101/2022.11.21.517407 .	11 2022
Bond, Marielle L., Eric S. Davis , Ivana Y. Quiroga, Michael I. Love, Hyejung Won, and Douglas H. Phanstiel. 2022. “Chromatin Loop Dynamics during Cellular Differentiation Are Associated with Changes to Both Anchor and Internal Regulatory Features.” <i>bioRxiv</i> . https://doi.org/10.1101/2022.10.31.514600 .	11 2022
Kathleen S.M. Reed*, Eric S. Davis *, Marielle L. Bond, Alan Cabrera, Eliza Thulson, Ivana Yoseli Quiroga, Shannon Cassel, Kamisha T. Woolery, Isaac Hilton, Hyejung Won, Michael I. Love, Douglas H. Phanstiel. Temporal analysis suggests a reciprocal relationship between 3D chromatin structure and transcription. <i>Cell Reports</i> . 41, 5 (2022). https://doi.org/10.1016/j.celrep.2022.111567	11 2022
Eliza Thulson*, Eric S Davis *, Susan D’Costa*, Philip R Coryell, Nicole E Kramer, Karen L Mohlke, Richard F Loeser, Brian O Diekman, Douglas H Phanstiel. 3D chromatin structure in chondrocytes identifies putative osteoarthritis risk genes, <i>Genetics</i> . iyac141 (2022). https://doi.org/10.1093/genetics/iyac141	09 2022
Mu, Wancen, Eric Davis , Stuart Lee, Mikhail Dozmorov, Douglas H. Phanstiel, and Michael I. Love. 2022. “bootRanges: Flexible Generation of Null Sets of Genomic Ranges for Hypothesis Testing.” <i>bioRxiv</i> . https://doi.org/10.1101/2022.09.02.506382 .	09 2022

- Davis, Eric S.**, Wancen Mu, Stuart Lee, Mikhail G. Dozmorov, Michael I. Love, and Douglas H. Phanstiel. 2022. "matchRanges: Generating Null Hypothesis Genomic Ranges via Covariate-Matched Sampling." *bioRxiv*. <https://doi.org/10.1101/2022.08.05.502985>. 09|2022
- Kelly, M.R., Wisniewska, K., Regner, M.J., Lewis, M.W., Perreault, A.A., **Davis, E.S.**, Phanstiel, D.H., Parker, J.S., Franco, H.L. A multi-omic dissection of super-enhancer driven oncogenic gene expression programs in ovarian cancer. *Nat Commun*. 13, 4247 (2022). <https://doi.org/10.1038/s41467-022-31919-8> 04|2022
- 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. *Bioinformatics*. btac057. (2022). <https://doi.org/10.1093/bioinformatics/btac057> 02|2022
- Gu, Huiya, Hannah Harris, Moshe Olshansky, Yossi Eliaz, Akshay Krishna, Achyuth Kalluchi, Mozes Jacobs, et al. 2021. "Fine-Mapping of Nuclear Compartments Using Ultra-Deep Hi-C Shows That Active Promoter and Enhancer Elements Localize in the Active A Compartment Even When Adjacent Sequences Do Not." *bioRxiv*. <https://doi.org/10.1101/2021.10.03.462599>. 10|2021
- Eric S Davis**, Arunava Ghosh, Raymond D Coakley, Joe A Wrennall, Bob A Lubamba, Temperance R Rowell, Hong Dang, Erica A Pawlak, Qiefeng Li, Neil E Alexis, Carla M P Ribeiro, Robert Tarran. Chronic E-Cigarette Exposure Alters Human Alveolar Macrophage Morphology and Gene Expression. *Nicotine & Tobacco Research*. 24, 3. March 2022. Pages 395399. <https://doi.org/10.1093/ntr/ntab186> 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, Snavelly 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 09|2020

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.

Patwardhan MN, Wenger CD, **Davis ES**, Phanstiel DH. Bedtoolsr: An R package for genomic data analysis and manipulation. *Journal of Open Source Software*, 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. *Journal of Open Source Software*, 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. *Am J Respir Crit Care Med*. 2018;198(1):67-76. doi:[10.1164/rccm.201710-2033OC](https://doi.org/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. *PLOS Biology*. 2018;16(3):e2003904. doi:[10.1371/journal.pbio.2003904](https://doi.org/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. *Biol Reprod*. 2017;97(3):466-477. doi:[10.1093/biolre/iox101](https://doi.org/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. *Scientific Reports*. 2017;7(1):7459. doi:[10.1038/s41598-017-07862-w](https://doi.org/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
Dynamic Modeling A2
Evolutionary & Functional Genomics B1
Evolutionary & Functional Genomics B2
Quantitative Genetics C1

H
P
H
H
H

BBSP FIRST YEAR GROUP FACULTY CO-MENTORS

Ben Major	benmajor@med.unc.edu
Greg Wang	greg_wang@med.unc.edu
Natasha Snider	natasha_snider@med.unc.edu
Nick Brown	nbrown1@med.unc.edu
Mike Bressan	michael_bressan@med.unc.edu
Doug Phanstiel	douglas_phanstiel@med.unc.edu

DISSERTATION COMMITTEE

Terry Furey	tsfurey@email.unc.edu
Karen Mohlke	karen_mohlke@med.unc.edu
Michael Love	mllove@email.unc.edu
Hyejung Won	hyejung_won@med.unc.edu
Daniel Dominguez	didoming@email.unc.edu
Doug Phanstiel	douglas_phanstiel@med.unc.edu

REFERENCES

Douglas Phanstiel, Ph.D. Assistant Professor of Cell Biology & Physiology, UNC-CH	douglas_phanstiel@med.unc.edu
--	--

Michael Love, Ph.D. Associate Professor of Biostatistics and Genetics, UNC-CH	mllove@email.unc.edu
--	--

Benjamin Vincent, MD Assistant Professor, Division of Hematology/Oncology, UNC-CH	benjamin_vincent@med.unc.edu
---	--

Daniel Dominguez, Ph.D. Assistant Professor of Pharmacology, UNC-CH	didoming@email.unc.edu
--	--

Robert Tarran, Ph.D. Professor of Cell Biology & Physiology, UNC-CH	robert_tarran@med.unc.edu
--	--