Zachery Mielko

Postdoc · Bioinformatic Algorithms · Duke University

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Education

Duke University *2017 - 2023*

PhD Genetics and Genomics

M.S. Computer Science

Kennesaw State University *2011 - 2017*

M.S. Integrative Biology

B.S. Biology

Research Experience

Duke University - Department of Biostatistics and Bioinformatics *2017 - Present*

Advisor: Raluca Gordan PhD *Durham, NC*

- Led the development of the UV-Bind platform to gather high-throughput measurements of transcription factor binding to UV irradiated DNA.
- Created a novel algorithm, CtrlF-TF, to call transcription factor binding sites using high-throughput protein-binding data.
- Collaborated on multiple protein-DNA interaction projects covering post-translational protein modifications, DNA mismatches, and impacts of binding site mutations.

Kennesaw State University - Department of Molecular and Cellular Biology *2015-2017*

Advisor: Martin Hudson PhD *Kennesaw, GA*

- Co-led one and collaborated on another project studying regulatory architecture of *Caenorhabditis elegans* pro-neural genes.

Kennesaw State University - Department of Biology and Chemistry *2011-2014*

Co-Advisors: Peter Sakaris PhD and Mark Sugalski PhD *Marietta, GA*

- Modeled the age and growth of the invasive swamp eel, *Monopterus albus*, in the Florida Everglades.

Publications

** Co-first authors; ✉ Co-corresponding authors*

Mielko, Z., Zhang, Y., Sahay, H., Liu, Y., Schaich, M.A., Schnable, B., Morrison, A., Burdinski, D., Adar, S., Pufall, M., Van Houten, B., Gordân R.✉, and Afek, A.✉, 2023. UV irradiation remodels the specificity landscape of transcription factors. ***Proceedings of the National Academy of Sciences***. 120(11) e2217422120.

> **Feature article in PNAS commentary**: Adeyemi., R. Transcription and DNA repair collide after UV exposure. 2023. *Proceedings of the National Academy of Sciences* 120(16), e2303201120

Afek, A., Shi, H., Rangadurai, A., Sahay, H., Senitzki, A., Xhani, S., Fang, M., Salinas, R., **Mielko, Z.**, Pufall, M.A., Poon, G.M., Haran, T.E., Schumacher M.A., Al-Hashimi, H.M.✉, and Gordân, R.✉, 2020. DNA mismatches reveal conformational penalties in protein–DNA recognition. ***Nature****, 587(7833)*, pp.291-296.

Aquino-Nunez, W.*, **Mielko, Z.E.***, Dunn, T., Santorella, E.M., Hosea, C., Leitner, L., McCalla, D., Simms, C., Verola, W.M., Vijaykumar, S. and Hudson, M.L., 2020. cnd-1/NeuroD1 Functions with the Homeobox Gene ceh-5/Vax2 and Hox Gene ceh-13/labial To Specify Aspects of RME and DD Neuron Fate in Caenorhabditis elegans. ***G3: Genes, Genomes, Genetics****, 10(9)*, pp.3071-3085.

Christensen, E.L., Beasley, A., Radchuk, J., **Mielko, Z.E.**, Preston, E., Stuckett, S., Murray, J.I. and Hudson, M.L., 2020. ngn-1/neurogenin Activates Transcription of Multiple Terminal Selector Transcription Factors in the Caenorhabditis elegans Nervous System. ***G3: Genes, Genomes, Genetics.***

Martin, V.*, Zhao, J.*, Afek, A., **Mielko, Z.** and Gordân, R., 2019. QBiC-Pred: quantitative predictions of transcription factor binding changes due to sequence variants. ***Nucleic acids research**, 47(W1)*, pp.W127-W135.

Belo, Y., **Mielko, Z.**, Nudelman, H., Afek, A., Ben-David, O., Shahar, A., Zarivach, R., Gordan, R. and Arbely, E., 2019. Unexpected implications of STAT3 acetylation revealed by genetic encoding of acetyl-lysine. ***Biochimica et Biophysica Acta (BBA)-General Subjects**. 1863(9)*, pp.1343-1350.

Software

CtrlF-TF: Transcription Factor Binding Site Caller *2022*

https://pypi.org/project/CtrlF-TF/

Teaching Experience

Co-Instructor

2021-2022 **Genetics and Genomics Informatics Bootcamp**, Duke University
2020 **Who is Binding my DNA?**, North Carolina School of Science and Mathematics
2019 **Data Carpentry for Genomics**, Duke University

Teaching Assistant

2019 **Scientific Computing for Genomics**, Duke University
2019 **Genetics and Genomics Informatics Bootcamp**, Duke University
2019 **Modeling Protein-DNA Interactions**, Duke University
2015-2016 **Biology I Laboratory**, Kennesaw State University
2014 **Biology II Laboratory**, Kennesaw State University

Scholarships and Awards

Duke School of Medicine Biomedical PhD Student Research Pilot Grant *2021*
Duke Precision Genomics Collaboratory and Office of Biomedical Graduate Education *$2000*

National Institute of General Medical Sciences Tuition Grant *2018*
Cold Spring Harbor Laboratory *$1500*

Outstanding Graduating Student Award *2017*
Kennesaw State University

Conference Presentations

** Platform Talk*

*Transcription Factors Bind to UV Lesions and Interfere with Damage Recognition by UV-DDB.Environmental Mutagenesis and Genomics Society, Virtual, 2021

The Impact of UV Damage on Transcription Factor Binding Specificity.RECOMB-Computational Cancer Biology, Paris France, 2018

Identification of novel *kal-1* transcriptional regulators via bioinformatics approaches. 21st International C. elegans Conference, Los Angeles California, 2017.

Transcriptional Regulation of *kal-1* during *C. elegans* Embryogenesis. Emory University STEM Research Symposium, Atlanta Georgia, 2016.

*Age and Growth of the Asian Swamp Eel, *Monopterus albus*. Southern Division of the American Fisheries Society, Charleston South Carolina, 2014.

Professional Development, Service and Outreach

2022 **ISMB Codeathon: iCn3D**, Intelligent Systems for Molecular Biology Conference - Madison, WI
2022 **Certified Software Carpentries Instructor**, The Carpentries - https://carpentries.org
2018-2019 **Scientist Mentor**, North Carolina School of Science and Mathematics
2018-2019 **Scientist Pen-Pal**, Letters to a Pre-Scientist - https://www.prescientist.org/
2018 **Statistical Methods for Functional Genomics**, Cold Spring Harbor Laboratory - Cold Spring Harbor, NY
2016 **Gene Regulatory Networks for Development**, Marine Biological Laboratory - Woods Hole, MA