Zarek S. Siegel

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Education

University of California, San Diego, La Jolla, CA..JUNE 2021
Master of Science, Neurosciences Graduate Program, GPA: 3.78, completed additional coursework for Specialization in Computational Neuroscience

Wesleyan University, Middletown, CT...MAY 2016
Bachelor of Arts, GPA: 4.03, Triple Major: Neuroscience & Behavior, Chemistry, & Science in Society Program (SISP)
Honors: High Honors in Chemistry (May 2016); Hawk Prize in biochemistry (April 2016); American Society of Biochemistry and Molecular Biology Honor Society ΧΩΛ (January 2016); Early Inductee into Phi Beta Kappa Society (December 2015); American Chemical Society Analytical Chemistry Award (April 2015); Dean's List (every semester)

Palo Alto High School, Palo Alto, CA...JUNE 2012
National Merit Finalist; California Scholarship Federation Member

Outside coursework: Coursera (Logic: Language and Information 1, Drugs and the Brain, Programming for Everybody (Python), Computer Science 101), Lynda (programming courses)

Experience

Graduate Researcher, *Eric Halgren & Maxim Bazhenov Groups (co-advisors),*
Departments of Physiology and Medicine, UC San Diego……………………..AUGUST 2018-JUNE 2021
Research primarily on an NIH-funded project on the effects of direct electrical surface stimulation of the cerebral cortex, created *in silico* models of the activation function of reconstructed neurons, used as input to models of networks of biophysically-realistic neurons for validation by optogenetic imaging of mice stimulated *in vivo* and in human subjects undergoing exploratory neurosurgery.

Course Assistant,
Division of Biological Sciences, UC San Diego
Led discussion sections, reviewed and helped develop lectures, graded homework/exams, advised and helped students over email and in person.
Neural Data Science (Prof. Ashley Juavinett)...JANUARY-MARCH 2020
Computational Cell Neurobiology (Prof. Terrence Sejnowski)...............................MARCH-JUNE 2020

Research Technician, *Harel Weinstein Group,*
Department of Physiology and Biophysics, Weill Cornell Medicine..............OCTOBER 2017-JUNE 2018
Worked under Dr. George Khelashvili. Computational investigation of the human opsin receptor using molecular dynamics, focusing on effects of mutations on dimerization.

Research Technician, *Michael LeVine Group,*
Department of Physiology and Biophysics, Weill Cornell Medicine................JULY 2016-OCTOBER 2017
Computational investigation of the serotonin and leucine transporter proteins (SERT, LeuT) using molecular dynamics and docking simulations, focusing on the mechanisms of ligand binding to the S2 site of SERT.

Undergraduate Researcher, *Erika Taylor Group,*

Department of Chemistry, Wesleyan University...SEPTEMBER 2014-MAY 2016

> Computational screening and development of novel inhibitors of Heptosyltransferase I (HepI) and the histone acetyltransferase domain of E1A binding protein p300 as part of an NIH-funded grant. Generated large data sets using molecular docking, analyzed in conjunction with *in vitro* and *in vivo* data from collaborators.

QAC Summer Apprentice,

Quantitative Analysis Center, Wesleyan University..MAY-AUGUST 2015

> Received funding to work full-time (40 hrs/wk) on drug development project, gained experience in statistical analysis and programming.

Summer Researcher,

Russell Fernald Group, Department of Biology, Stanford University........................JUNE-AUGUST 2014

> Behavioral neuroscience/neuroethology of African cichlids, especially with reference to bower building behavior and social dominance. Helped develop an ethogram for a new model species.

Course Assistant,

Department of Chemistry, Wesleyan University

> Led discussion sections, graded problem sets and exams, helped with homework and working through problems.
> *Principles of Chemistry* (Profs. Brian Northrop, T. D. Westmoreland).....SEPTEMBER 2013-MAY 2014
> *Organic Chemistry* (Profs. Erika Taylor, Michael Calter)..........................SEPTEMBER 2014-MAY 2016

Department Peer Advisor,

Office of Student Affairs, Wesleyan University...JUNE 2015-MAY 2016

> Answered questions for underclassmen and transfer students regarding planning classes and completing major requirements for Chemistry and Neuroscience & Behavior Departments. Nominated to the position by Chemistry department chair.

Chemistry Tutor,

Office of Student Affairs*,* Wesleyan University...FALL 2014-SPRING 2015

> Conducted one-on-one sessions with students on difficult concepts and homework problems.

Camp Counselor,

Palo Alto Junior Museum and Zoo, Palo Alto, CA...................................JUNE-AUGUST 2010, 2011, 2013

> Taught basic scientific concepts and led activities with 3-5 year-olds at Science for Pre-Schoolers and Science for Kinders camps.

Presentations and Publications

- Publications:
  - *Under review*: Halgren, A., **Siegel, Z. S.**, Golden, R., Bazhenov, M. Multielectrode Cortical Stimulation Selectively Induces Unidirectional Wave Propagation of Excitatory Neuronal Activity in Biophysical Neural Model.
  - Khelashvili, G., Pillai, A. N., Lee, J., Pandey, K., Payne, A. M., **Siegel, Z. S.**, Cuendet, M. A., Lewis, T. R., Arshavsky, V. Y., Broichhagen, J., Levitz, J., & Menon, A. K. (2021). Unusual mode of dimerization of retinitis pigmentosa-associated F220C rhodopsin. *Scientific Reports*, *11*(1), 1-20. https://doi.org/10.1038/s41598-021-90039-3
  - Henry, R. A., Kuo, Y. M., **Siegel, Z. S.**, Yen, T. J., Rhodes, J., Taylor, E. A., & Andrews, A. J. (2019). Discordant Effects of Putative Lysine Acetyltransferase Inhibitors in Biochemical and Living Systems. *Cells, 8*(9), 1022. https://doi.org/10.3390/cells8091022

- LeVine, M. V., Terry, D. S., Khelashvili, G., **Siegel, Z. S.**, Quick, M., Javitch, J. A., Blanchard, S. C. Weinstein, H. (2019). The allosteric mechanism of substrate-specific transport in SLC6 is mediated by a volumetric sensor. *Proceedings of the National Academy of Sciences*, *116*(32), 15947–15956. https://doi.org/10.1073/pnas.1903020116
- Nkosana, N. K., Czyzyk, D. J., **Siegel, Z. S.**, Cote, J. M., & Taylor, E. A. (2018). Synthesis, kinetics and inhibition of *Escherichia coli* Heptosyltransferase I by monosaccharide analogues of Lipid A. *Bioorganic & Medicinal Chemistry Letters*, *28*(4), 594–600. https://doi.org/10.1016/j.bmcl.2018.01.040
- Cote, J. M., Ramirez-Mondragon, C. A., **Siegel, Z. S.**, Czyzyk, D. J., Gao, J., Sham, Y. Y., Mukerji, I., & Taylor, E. A. (2017). The Stories Tryptophans Tell: Exploring Protein Dynamics of Heptosyltransferase I from *Escherichia coli*. *Biochemistry*. *56*(6), 886-895. https://doi.org/10.1021/acs.biochem.6b00850

- ***Senior Honors Thesis:*** "*In silico* screening and analysis of small molecule ligands binding to Heptosyltransferase I and the histone acetyltransferase domain of E1A binding protein p300" (April 2016).
- *Poster*: "The association between anxiety symptoms and use of sedative drugs in the national epidemiologic study of alcohol and related conditions" (April 29th, 2016).
- *Poster*: "Computational design of enzyme inhibitors: Understanding the binding of inhibitors to Heptosyltransferase I and the histone acetyltransferase domain of E1A binding protein p300 using molecular docking" (April 15th, 2016).
- *Poster*: "Computational Design of Enzyme Inhibitors: Virtual screening and analysis of virtual ligands to develop high-affinity inhibitors of Heptosyltransferase I the p300 Histone acetyltransferase domain" (July 30th, 2015).
- *Acknowledged in*: York, R. A., Patil, C., Hulsey, C. D., Streelman, J. T., & Fernald, R. D. (2015). Evolution of bower building in Lake Malawi cichlid fish: phylogeny, morphology, and behavior. *Frontiers in Ecology and Evolution, 3*(March), 1–13. https://doi.org/10.3389/fevo.2015.00018

Skills

- *Languages*: fluent Spanish; intermediate German; basic Portuguese, Russian
- *Programming*: Python (NumPy, Pandas, Matplotlib), Matlab, R (Ggplot), Bash shell, LaTeX, Tcl; basic knowledge of C++, Perl, Mathematica, HTML/CSS, JavaScript
- *Software*: Microsoft Word, Excel, PowerPoint, Apple Logic Pro; Comfortable in Mac OS X, Windows, Linux (including command line, and cluster computing); Molecular dynamics (NAMD, VMD), Molecular modeling/visualization (PyMol, OpenBabel, ChemDraw, ChemBio3D), Schrödinger Suite

Other Information

- *Interests:* brains (neurotransmitters, consciousness, psychopharmacology), linguistics (phonology, language evolution, neurolinguistics, writing systems), languages, music (ukulele, banjo, electronic, theory, Javanese Gamelan), native plants/ecology, technology, artificial intelligence, information theory, philosophy/social theory of science
- *Hobbies:* walking, hiking, gardening, freshwater aquariums, trave, photography, constructed languages, learning languages, coding/automation, listening to audiobooks & podcasts