

## SUMMARY.....

**I bring fifteen years of research experience in synthetic organic chemistry and bioinformatics.** I excel in end-to-end analysis of large datasets from diverse or multi-omic sources, including transcriptomics, metabolomics, cheminformatics, and metabolomic assays. I am an expert in Python and workflow development and experienced in containerization (Docker), Git, and continuous integration practices. I have deployed machine learning, generalized linear models, and custom hierarchical Bayesian models for hypothesis generation in statistical and exploratory analysis. Most importantly, I can communicate complex results to various audiences, including commodity stakeholders, private industry, and scientific collaborators.

## SKILLS.....

Science	Computing	Chemistry	Bio/Chem-informatics
<ul style="list-style-type: none"> <li>Experimental design</li> <li>Manuscript &amp; grant preparation</li> <li>Experienced educator &amp; communicator</li> </ul>	<ul style="list-style-type: none"> <li>Python, R, Bash, Groovy, L<sup>A</sup>T<sub>E</sub>X</li> <li>Machine Learning, Probabilistic Programming</li> <li>Git, continuous integration</li> <li>Workflows, HPC, AWS, Slurm</li> <li>Nextflow, Docker, Singularity</li> </ul>	<ul style="list-style-type: none"> <li>Organic Synthesis</li> <li>Purification &amp; characterization</li> <li>Chromatography</li> <li>Mass spectrometry</li> <li>Nuclear Magnetic Resonance</li> </ul>	<ul style="list-style-type: none"> <li><i>in-silico</i> compound generation</li> <li>Feature selection.</li> <li>Generalized Linear Models</li> <li>Bayesian statistics</li> <li>Advanced visualizations</li> </ul>

## SELECTED PROJECTS & KEY CONTRIBUTIONS.....

<i>Metabolomics of wine and wildfire</i>	<ul style="list-style-type: none"> <li>Utilized and expanded upon an untargeted metabolomics approach to evaluate critical molecules associated with smoke taint in wine.</li> <li>Developed an in-silico library of potential smoke-associated compounds created by permuting known enzyme transformations upon suspected smoke contaminants.</li> </ul>
<i>Terabyte scale workflow development</i>	<ul style="list-style-type: none"> <li>Assisted in the design and development of this nextflow workflow script.</li> <li>Wrote and containerized, with Docker and Singularity, scripts for use within the workflow. This involved programming in bash, Groovy, Python, and R.</li> </ul>
<i>Profiling complex phenotypes in apples</i>	<ul style="list-style-type: none"> <li>Analyzed time-series apple transcriptomics and scald data and identified gene expression patterns associated with increased scald risk.</li> <li>Provided writings, figures, and analyses for grant applications.</li> </ul>
<i>Synthetic Organic Chemistry</i>	<ul style="list-style-type: none"> <li>In my dissertation I investigated novel synthetic methods using S-Nitrosothiols.</li> <li>Planned and ran synthetic organic chemistry reactions.</li> <li>Purified and characterized products using LCMS, NMR, and mass-spectroscopy.</li> <li>Ordered chemical reagents and lab supplies.</li> </ul>
<i>Statistics Consulting</i>	<ul style="list-style-type: none"> <li>Consulted on data analysis for consumer trials.</li> <li>Wrote generalized linear models in R.</li> <li>Wrote Bayesian model using PyMC.</li> </ul>

## REFERENCES.....

*Available upon request.*

## PROFESSIONAL EXPERIENCE & EDUCATION .....

2018 - 2024	<b>Postdoctoral Researcher</b> to Dr. Stephen Ficklin. Department of Horticulture, Washington State University, Pullman WA, 99163
2017 - 2018	<b>Postdoctoral Researcher</b> joint appointment with Dr. Aurora Clark & Dr. Stephen Ficklin. Washington State University, Pullman WA, 99163
2012 - 2017	<b>Ph.D.</b> Synthetic Organic Chemistry. Dissertation on the <i>Synthetic Applications of S-Nitrosothiols</i>
2009 - 2012	<b>Research Assistant</b> to Ming Xian. Washington State University, Pullman WA, 99163
2012 - 2017	<b>Ph.D.</b> in <i>Organic Chemistry</i> , Dissertation: Synthetic uses of S-Nitrosothiols in Organic Chemistry Washington State University, Pullman WA, 99163
2006 - 2012	<b>Bachelors of Science</b> in <i>Chemistry</i> Washington State University, Pullman WA, 99163

## TEACHING EXPERIENCE AT W.S.U. ....

2022	<b>Instructor</b> AFS 505 Topics in Computational and Analytical Methods for Scientists. Introduction to data science using Python. Created course content and gave lectures.
2018	<b>Co-Instructor</b> HORT 503 Advanced Topics: Data Analytics for Scientists. Introduction to data science using Python. Assisted in course creation and gave lectures.
2013 - 2016	<b>Teaching Assistant</b> of first and second semester organic chemistry.
2013	<b>Teaching Assistant</b> of second semester organic chemistry.
2010	<b>Tutor</b> of general & organic chemistry
2009, 2016	<b>Teaching Assistant</b> of Organic Qualitative Analysis Laboratory

## SELECTED PEER-REVIEWED PUBLICATIONS .....

1. John Hadish, **Tyler Biggs**, Ben Shealy, M. Reed Bender, Coleman B. McKnight, Connor Wytko; Melissa C. Smith; F. Alex Feltus; Loren Honaas, Stephen Ficklin. GEMmaker: process massive RNA-seq datasets on heterogeneous computational infrastructure (2022), *BMC Bioinformatics*
2. Cameron Ogle, David Reddick, Coleman McKnight, **Tyler Biggs**, Rini Pauly, Stephen P. Ficklin, F. Alex Feltus, and Susmit Shannigrahi. Named Data Networking for Genomics Data Management and Integrated Workflows. *Front. Big Data*. (2021) doi:10.3389/fdata.2021.582468
3. Craig McConnel, Sierra Crisp, **Tyler Biggs**, Lindsay Parrish, William Sischo, Amber Adams-Progar, Stephen Ficklin. Transcriptomic analysis of peripheral leukocytes in dairy cows with and without evidence of early postpartum disease. *Frontiers in Veterinary Science* (2020) doi:10.15232/aas.2020-02092
4. Craig McConnel, Sierra Crisp, **Tyler Biggs**, Stephen Ficklin, Lindsay M. Parrish, Sophie Trombetta, William M. Sischo, Amber Adams-Progar. A fixed cohort field study of gene expression in circulating leukocytes from dairy cows with and without mastitis. *Journal of Dairy Science* (2020) doi:10.3389/fvets.2020.559279
5. Caihong Zhang, **Tyler Biggs**, Nelmi Devarie-Baez, Shaomin Shuang, Chuan Dong, Ming Xian. S-Nitrosothiols: Chemistry and Reactions. *Chem. Commun.* (2017) doi:10.1039/C7CC06574D
6. **Tyler Biggs**, Laksiri Weerasinghe, Chung-Min Park, Ming Xian. Phosphine mediated conjugation of S-nitrosothiols and aldehydes. *Tetrahedron Letters* (2015) doi:10.1016/j.tetlet.2015.04.017
7. Yu Zhao, **Tyler Biggs**, Ming Xian. Hydrogen sulfide (H<sub>2</sub>S) releasing agents: chemistry and biological applications. *Chemical Communications*. (2014) doi:10.1039/C4CC00968A
8. Chung-Min Park, Wei Niu, Chunrong Liu, **Tyler Biggs**, Jiantao Guo, Ming Xian. A Proline-Based Phosphine Template for Staudinger Ligation. *Organic Letters* (2012) doi:10.1021/ol3022484

## OPEN SOURCE SOFTWARE .....

- GEMmaker: a Nextflow workflow for large-scale gene expression sample processing, expression-level quantification and Gene Expression Matrix (GEM) construction. Results from GEMmaker are useful for differential gene expression (DGE) and gene co-expression network (GCN) analyses. The GEMmaker workflow currently supports Illumina RNA-seq datasets.  
**Contribution:** Assisted in development and testing.
- Pynome: a product of the NSF-funded SciDAS project; It is used to automate retrieval and preparation of whole genome sequences for a variety of Eukaryotic species. Pynome integrates with iRODs to prepare large-scale genomic analytics workflows.  
**Contribution:** Assisted in design, and primary contributor to version 1.0.