

# JUSTIN S. WILLIAMS

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## EDUCATION

### The Pennsylvania State University

- Ph.D. in Biochemistry, Microbiology and Molecular Biology

University Park, PA

December 2016

### Indiana University of Pennsylvania

- B.S. in Biochemistry

Indiana, PA

May 2010

## RESEARCH EXPERIENCE

### St. Jude Children's Research Hospital

#### *Postdoctoral Research Associate*

- Inferring genome-wide histone enrichment and gene expression from DNA methylome in pediatric cancer.
- Single-cell CNV estimation by TPM.
- Genetic and epigenetic analysis of Wilm's Tumor.
- Machine learning approaches for CRISPR/Cas9 off-target prediction.

Memphis, TN

2017-Current

### The Pennsylvania State University

#### *Graduate student with Dr. Teh-hui Kao*

- Assembled (*de novo*) and analyzed the sub-centromeric *S*-locus of *Petunia inflata*; performed comparative genomics between solanaceous *S*-loci.
- Identified novel F-box genes by a *de novo* transcriptome analysis.
- Determined *S*-locus F-box protein interaction specificity by transgenic assays.
- Chimeric protein interaction specificity by transgenic assays.

University Park, PA

2010-2016

### Indiana University of Pennsylvania

#### *Undergraduate Research Assistant with Dr. John Southard*

- Performed fluorophore targeted mutagenesis.

Indiana, PA

2009-2010

#### *Undergraduate Research Assistant with Dr. Jana Villemain*

- Performed protein purification in the study of DNA helicase Srs2.

2007-2008

## SKILLS and TECHNIQUES

### Bioinformatics and related skills:

- Analysis of single-cell RNA-seq data
- Feature and response variable development of NGS data.
- Machine learning including traditional and deep-learning approaches.
- Illumina RNA-seq sample preparation; Transcriptome assembly (*de novo*) and quality analysis.
- Hybrid genome assembly (PacBio and Illumina- *de novo*) and quality analysis.
- Novel gene annotation and discovery; phylogenetic analysis.

### Software:

- Python, R, Bash and Linux OS.

### Wet lab skills:

- Immunofluorescence labeling and cell-sorting.
- Mammalian and plant cell culture.
- Ti-vector design and construction; *Agrobacterium tumefaciens*-mediated plant tissue transformation.

- Chimeric protein design for interaction specificity assays.
- Genetic linkage analysis and transcript expression by qPCR and RNA-seq.

## LEADERSHIP EXPERIENCE

- St. Jude Children's Research Hospital** Memphis, TN  
**Department Representative - Postdoctoral Leadership Council** 2017-18
- Helped with PDLC sponsored department fundraisers, new department postdoctoral orientation, and events for children and patients of St. Jude.
- Summer Intern Mentor** Summer 2018
- Helped undergraduate students design and perform CRISPR/Cas9 experiments, validation and results interpretation
- The Pennsylvania State University** University Park, PA  
**Thesis Mentor, Undergraduate Schreyer Honors College** 2013-16
- Helped undergraduate students design and perform molecular genetic experiments.
- Teaching Assistant Microbiology 107** Summer 2016
- Prepared materials and guided laboratory section.
- Mentor, Summer Experience in the Eberly College of Science** Summer 2014-15
- Guided high school students through molecular biology experiments.
- Teaching Assistant Microbiology 412** Fall 2011
- Presented laboratory lectures and guided laboratory section.
- Teaching Assistant Microbiology 202** Spring 2011
- Prepared materials and guided laboratory section; wrote and graded exams.
- Indiana University of Pennsylvania** Indiana, PA  
**President, Professional Fraternity of Chemists (*Alpha Chi Sigma*)** 2009-2010
- Planned and executed educational outreach for underprivileged students, K-12 and provided fund-raising for local charities.

## CONFERENCE, POSTER PRESENTATIONS

- Williams JS**, Xu B, Putnam D, Thrasher A, and Chen X. DNA methylation reveals alternative promoter usage in genes critical to pediatric tumors. AACR, "Scholar-in-Training Award" Online, June 2020
- Williams JS** and Xiang Chen. Methyl2Activity: A deep learning based model to predict epigenetic and transcriptional activities from DNA methylation. ISMB. Basel, Switzerland. July 2019.
- Williams JS** and Xiang Chen. Methyl2Acetyl: Inferring Histone Enrichment and Gene Expression from WGBS. Poster presentation, ISMB. Chicago, Illinois. July 2018.
- Williams JS**, Wu L, and Kao, T-h. Identification of 17 *S-locus F-box* genes of *Petunia inflata* by pollen transcriptome analysis and use of BAC clones containing pollen and pistil genes to characterize the *S-locus*. Abstract and oral presentation at World Petunia Conference. Murten, Switzerland. April 2015.
- Williams JS**, Der JP, dePamphilis CW, and Kao, T-h. Identification of a complete suite of *Petunia S-locus F-box* genes involved in self-incompatibility by pollen transcriptome analysis. Poster and oral presentation in "Hot Topics by Emerging Scientists: Emerging Models", American Society of Plant Biologists. Portland, Oregon. July 2014.

## PUBLICATIONS

- Williams JS**, Xu B, Putnam D, Thrasher A, and Chen X (2020). MethylationToActivity: a deep-learning framework that reveals promoter activity landscapes from DNA methylomes in individual tumors. *In Review*. BioRxiv doi: 10.1101/2020.06.09.143172
- Chen W, Zhang S, **Williams JS**, Ju B, Shaner B, Easton J, Wu G, and Chen X (2020). A comparison of methods accounting for batch effects in differential expression analysis of UMI count based single cell RNA sequencing. *Comp. Struct. Biotech. J.* doi: 10.1016/j.csbj.2020.03.026
- Murphy A, Chen X, Pinto E, **Williams JS**, et al., (2019). Forty-five patient-derived xenografts capture the clinical and biological heterogeneity of Wilms tumor. *Nat. Med.* doi: 10.1038/s41467-019-13646-9
- Cheng C, Easton J, Rosencrance C, Li Y, Ju B, **Williams JS**, Mulder HL, Chen W, and Chen X (2019). LCA robustly reveals subtle diversity in large-scale single-cell RNA-seq data. *Nucleic Acids Res.* doi: 10.1093/nar/gkz826
- Sun L, **Williams JS**, Li S, Wu L, Khatri WA, Stone PG, Keebaugh MD and Kao T-h (2018). S-Locus F-Box Proteins Are Solely Responsible for Pollen Function in S-RNase-Based Self-Incompatibility of *Petunia*. *Plant Cell*. doi: 10.1105/tpc.18.00615
- Wu L, **Williams JS**, Wang N, Khatri WA, San Román D, and Kao T-h (2017). Use of Domain-Swapping to Identify Candidate Amino Acids Involved in Differential Interactions between Two Allelic Variants of Type-1 S-Locus F-Box Protein and S<sub>3</sub>-RNase in *Petunia inflata*. *Plant Cell and Phys.* doi: 10.1093/pcp/pcx176
- Li S, **Williams JS**, Sun P, and Kao T-h (2016). All 17 types of S-locus F-box proteins of S<sub>2</sub>- and S<sub>3</sub>-haplotypes of *Petunia inflata* are assembled into similar SCF complexes with specific function in self-incompatibility. *Plant Journal* doi:10.1111/tpj.13222
- Williams JS**, Wu L, Shu L, Sun P, and Kao T-h (2015). Insight into S-RNase-based self-incompatibility in *Petunia*: recent findings and future direction. *Front. Plant Sci.* doi: 10.3389/fpls.2015.00041
- Sun P, Li S, Lu D, **Williams JS**, and Kao T-h (2015). Pollen S-locus F-box proteins of *Petunia* involved in S-RNase-based self-incompatibility are themselves subject to ubiquitin-mediated degradation. *Plant J.* 83:213–223.
- Williams JS**, Der JP, dePamphilis CW, and Kao T-h (2014). Transcriptome analysis reveals the same 17 *S-locus F-box* genes in two haplotypes of the self-incompatibility locus of *Petunia inflata*. *Plant Cell* 26:2873–2888.
- Sun P, **Williams JS**, Li S, and Kao, T-h (2014). S-RNase-based self-incompatibility in *Petunia*: a complex non-self-recognition system between pollen and pistil. In “Sexual Reproduction in Animals and Plants (Sawada H, Inoue N, Iwano M eds), 289–303, *Springer*, Tokyo Heidelberg New York Dordrecht London.
- Li S\*, Sun P\*, **Williams JS**, and Kao T-h (2014). Identification of the self-incompatibility-locus F-box protein-containing complex in *Petunia inflata*. *Plant Reprod.* 27:31–45, \*Co-first authors.
- Williams JS**, Natale CA, Wang N, Li S, Brubaker TR, Sun P, and Kao T-h (2014). Four previously identified *S-locus F-box* genes of *Petunia inflata* are involved in pollen specificity in self-incompatibility. *Mol. Plant* 7:567–569.