

YUHAN (OLIVIA) CHEN

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EDUCATION

Vanderbilt University

Bachelor of Science in **Chemistry**

Cumulative GPA: **4.00/4.00** | Dean's List

Relevant Coursework: Biochemistry, Bioinorganic Chemistry, Organometallic Chemistry, Organic Chemistry, Analytical Chemistry, Drug Design and Development

Nashville, TN

Anticipated May 2027

RESEARCH EXPERIENCE

Functional Characterization of TtlA1, an Alternative Cytochrome-Containing RiPP Precursor

Nashville, TN

Vanderbilt University, Research Assistant, Supervisor: Douglas Mitchell

September 2025 – Present

- Investigated an alternative precursor peptide, TtlA1, in a newly identified GABA_{tide} RiPP biosynthetic pathway, focusing on its unusual cytochrome-associated C-terminal domain and potential role in post-translational modification.
- Designed and assembled TtlA1_B + CCM expression constructs in pETDuet using Gibson assembly, verified plasmids by sequencing, and transformed them into *E. coli* BL21 for heterologous expression under double-antibiotic selection.
- Optimized protein expression and purification workflows by varying induction temperature and duration, performing Strep-Tactin XT affinity purification, and troubleshooting low-yield recovery through scale-up and alternative elution strategies for downstream NanoDrop and MALDI-MS analysis.

Amine Preference Profiling of TTLL Homologs for RiPP and Tubulin Modification Prediction

Nashville, TN

Vanderbilt University, Research Assistant, Supervisor: Douglas Mitchell

September 2025 – Present

- Studied how TTLL-family active-site features influence co-substrate amine preference, motivated by experimental evidence showing that a predicted glutamate-utilizing homolog instead preferentially used γ -aminobutyric acid (GABA).
- Integrated computational prediction and biochemical characterization to investigate how sequence motifs and binding-site properties correlate with substrate selectivity across TTLL homologs.
- Developed a mechanistic research framework to support amine source prediction, improve current substrate-prediction models, and clarify how TTLL-catalyzed modifications may contribute to tubulin-code regulation and disease-relevant biology.

Entropy Compensation in Serine Proteases Through Water-Driven Scaffold Dynamics

Nashville, TN

Vanderbilt University, Research Assistant, Supervisor: Stephanie Wankowicz

September 2024 – January 2026

- Investigated how ligand binding redistributes conformational entropy in serine proteases, testing the hypothesis that catalytic-site rigidification is offset by increased flexibility in distal, solvent-exposed scaffold regions.
- Curated and quality-controlled a dataset of ~1000 crystal structures across 9 serine protease families, re-refined structures in Phenix, generated multiconformer ensembles using qFit 3.0, and identified 216 matched apo, ground-state analog, and transition-state analog pairs for comparative analysis.
- Quantified residue-level flexibility through RMSF, order parameter (S^2), rotamer-state transitions, SASA, and nearby water occupancy, showing that catalytic and substrate-contacting residues generally rigidify upon binding while specific surface residues gain heterogeneity in association with local hydration loss and solvent-network reorganization.

UC Irvine, Laboratory for Retinal Organoids Therapy

Irvine, CA

Research Assistant, Supervisor: Magdalene J. Seiler

September 2023 – July 2024

- With a PhD student on 200+ mice for 150+ hours, cultivated retinal organoid tissue from stem-cell, which proved to be effective and applicable for restoring human beings' vision, even for those with advanced stages of retinal degeneration.
- Assisted in the specialized procedure of retinal progenitor sheet transplantation, involving comprehensive preparation of rats, including tattooing for identification, weaning, birth monitoring, and administering postsurgical treatment.
- Performed Hematoxylin and Eosin (H&E) staining for preliminary screening to target nucleus, subsequently conducted Indirect Fluorescent Antibody (IFA) for precise targeting of multiple tissue layers and isolate retinal transplant from the nucleus to track the recovery of retinal tissues.

Chinese Academy of Science, Laboratory for Dynamics of Citrus Protection and Virus

Beijing, China

Summer Research Internship

June 2023 – September 2023

- Collaborated with lab team to run experiments on the citrus surface, in to test the effectiveness of an antibody treatment (AMP) for HLB virus, the most serious disease for citrus, by breeding thousands of citrus psylla, the insects that transmitted the pathogen to citrus.
- Of MYC2 protein in three groups - healthy, antibody injected, and HLB disease infected leaves separately, showcasing the effectiveness of antibody treatment via a more pronounced banding.
- Improved the current existing CTAB-based DNA extraction method, modifying preprocessing steps prior to the experiment, including leaf veins slicing, adding CTAB- buffer preheating procedure, and increasing centrifugation time to better collect DNA samples. By 75%, significantly improves the citrus yield.

AWARDS AND HONORS

- Vanderbilt Undergraduate Summer Research Program (VUSRP) Awardee, Vanderbilt University
- ASPET Fellowship Awardee, American Society for Pharmacology and Experimental Therapeutics

PUBLICATION AND PRESENTATION

- Vanderbilt Undergraduate Research Symposium, Vanderbilt University

ADDITIONAL INFORMATION

Wet Lab: Cell culture, protein purification, molecular cloning, bacteria cultivation, gas phase analysis, and histology

Dry Lab: Phenix, qFit 3.0, PyMoL, Coot, Python, Protein structure refinement, multiconformer modelling, analysis of conformational entropy, rotamer analysis

Interests: Rock Climbing, Mountain Orienteering, Violin, Chinese Chess, and National Park Hiking