Trevor N. Purdy

SUMMARY

- Ph.D. in Chemical Biology with 3+ years of analytical experience in drug discovery and biomanufacturing industries
- Expert in mass spectrometry (QQQ, QToF, IonTrap) for small molecule quantitation and proficient with GC-FID
- Expert in HILIC, reverse phase, and chiral chromatography methods; developed methods for milligram to multigram scale small molecule separations and quantitation using RapidFire, UPLC-MS, HPLC-UV, and flash chromatography
- Expert in 1D and 2D NMR techniques for natural product characterization and quantitation
- Strong interpersonal and communication skills exemplified by 12 co-authored publications, mentoring undergraduate students, training multiple colleagues, and presenting results directly to chief executives

PROFESSIONAL EXPERIENCE

Scientist II, Analytical – *Genomatica* 2023 – Present

- Developed and validated 5 LC-MS methods using HILIC and reverse phase chromatography for absolute quantitation of fermentation metabolites using isotope labelled standards with 30% reduction in total turnaround time
- Authored 5 SOPs and coordinated with external commercial partners for method cross-validation procedures
- Reduced sample preparation time >5x by developing automated sample transfer and multi-step dilution protocols with aqueous and organic buffers using an Agilent Bravo liquid handler
- Self-taught operation of an Agilent RapidFire to quantify primary metabolites from in small scale fermentation cultures for high throughput screening – capable of screening >5,000 samples per day
- Developed a quantitative NMR method to measure formation of carbamate products in fermentation broth (quantitation by 1H NMR and verification of carbamate signals by HMBC experiments in pH-adjusted samples) in less than 2 weeks
- Trained 2 Research Associates and 1 Scientist to support high throughput sample preparation and quantitation using QQQ-MS

Scientist II – *Creo Ingredients* 2021 – 2023

- Spearheaded enzyme discovery campaign for berberine bridge enzymes (BBEs) with cannabinoid synthase-like activity, leading to the discovery of 10 novel bacterial enzyme scaffolds
- Engineered BBEs for chemoselective production of primary plant cannabinoid metabolites in a prokaryotic host organism
- Developed chiral column HPLC-UV methods for separation, purification, and quantitation of enantiomeric cannabinoid products
- Elucidated the structure of novel cannabinoid analogs generated in vitro using 1H and 2D NMR
- Presented results directly to company chief executives in monthly research update meetings

Research Associate, Drug Discovery – *Sirenas Marine Discovery* 2014 – 2015

- Isolated natural products from marine sponge crude extracts using a Sepbox separation system
- Optimized ninhydrin reagent test for identification of aminated cytotoxic payloads from crude extracts of marine sponges for antibody-drug conjugate (ADC) applications and identified ninhydrin adducts using QToF LC-MS
- Purified and dereplicated antibody-drug conjugate payloads from crude extracts and measured payload to monoclonal antibody (mAb) linking efficiency by HPLC-UV

EDUCATION

Ph.D., Chemical Biology – ***UC San Diego (Scripps Institution of Oceanography)*** 2015 – 2021

Thesis: *"Synthetic and Biocatalytic Strategies for Natural Product Synthesis via ortho-Quinone Methide Intermediates"*

- Isolated and characterized natural products from terrestrial and marine actinomycetes using HPLC-UV, LC-MS, IR, and NMR
- Optimized synthetic routes to halogenated marine natural products tetrachloropyrrole, pentachloropseudilin, and polyhalogenated analogs for medicinal chemistry applications

- Achieved a 18-step chemoenzymatic synthesis of the natural product chlorizidine A (11-step longest linear route)
- Heterologously expressed and purified microbial FAD-dependent oxidoreductase enzymes
- Characterized the function of a novel FAD-dependent oxidoreductase enzyme with unprecedented dehydrogenation activity
- Developed GC-MS, LC-MS, NMR, and fluorescence-based assays to screen FAD-dependent oxidoreductases for biocatalytic applications
- Mentored 3 undergraduate students to independently set up gram-scale chemical reactions and purify synthetic intermediates using HPLC and flash chromatography
- Received NIH Biotechnology Training Grant Award, American Society of Pharmacognosy (ASP) Student Research Award, and 4 Departmental Fellowship Awards

B.S., Molecular Synthesis – ***UC San Diego (Dept. of Chemistry)*** 2010 – 2015

- Conducted research in two research labs as an undergraduate and co-authored two publications
- Synthesized polymer intermediates and purified using flash chromatography; characterized intermediates using NMR spectroscopy
- Assisted in developing HPLC, GC-FID, and DESI-MS methods for synthetic intermediate characterization, monitoring reaction progression, and natural product dereplication

SELECTED PUBLICATIONS *(12 total co-authored, peer-reviewed publications)*

- Love, A.C.; **Purdy, T.N.**; Hubert, F.M.; Kirwan, E.J.; Holland, D.C.; Moore, B.S. Discovery of Latent Cannabichromene Cyclase Activity in Marine Bacterial Flavoenzymes. *ACS Synthetic Biology*, 13, 1343-1354 (2024)
- **Purdy, T.N.**; Moore, B.S.; Lukowski, A.L. Harnessing *ortho*-Quinone Methides in Natural Product Biosynthesis and Biocatalysis. *Journal of Natural Products*, 85, 688–701 (2022)
- **Purdy, T. N.**; Kim, M. C.; Cullum R.; Fenical, W.; Moore, B. S. Discovery and Biosynthesis of Tetrachlorizine Reveals Enzymatic Benzylic Dehydrogenation via an *ortho*-Quinone Methide. *JACS*, 143, 3682-3686 (2021)
- Chekan, J. R.; Lee, G. Y.; Gamal, A. E.; **Purdy, T. N.**; Houk, K. N.; Moore, B. S. Bacterial Tetrabromopyrrole Debrominase Shares a Reductive Dehalogenation Strategy with Human Thyroid Deiodinase. *Biochemistry*, 58, 5329-5338 (2019)

PATENTS

- **Purdy, T.N.**; Moore, B.S. *Cannabinoid Production in Bacteria*. WO2023043926A2 (accepted January 2025)

INSTRUMENTATION AND SOFTWARE SKILLS

Agilent RapidFire
Sciex QTrap 4500
Shimadzu Nexera X2 UHPLC
Agilent 1200 Series HPLC
Bruker, Varian, and JEOL NMR
Agilent Accurate-Mass Q-ToF
Bruker AmaZon IonTrap
ThermoFisher GC-FID
Teledyne Isco Combiflash EZ Prep
SepiaTec Sepbox 2D-2000
GE ÄktaPurifier FPLC
Agilent Bravo Liquid Handler
Tecan Freedom Evo 200 Liquid Handler
Sciex Analyst
Agilent MassHunter
Agilent Chemstation
ThermoFisher Chromeleon
MestraNova
ChemDraw
Cytoscape
BiG-SCAPE
PyMOL
Spotfire
Microsoft Office (Excel, PowerPoint, Word)
Benchling (LIMS)