PATRICK CHERRY

PhD scientist skilled in data visualization, statistical modeling, bioinformatics, biological data science, next-generation sequencing (NGS), and tool-building. I've coded reproducible and rigorous pipelines for high-throughput experimental designs and multi-omic analyses for communication to technical and non-technical audiences. I've launched best-in-class oncology reference standards, and invented new molecular methods for DNA and microbe manipulation. Originally trained in Molecular Biology, I am passionate about advancing data science and bioinformatics to improve human health.

CONTACT

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- 📞 upon request
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Last updated on 2024-03-27.

Data-driven résumé made in R using pagedown.

🎓 EDUCATION

PhD
University of Colorado School of Medicine — 📍 Aurora/Denver, Colorado

2019 | 2013

- Ph.D. in Molecular Biology
- Advisor: Jay Hesselberth, PhD.
- Thesis: RNA Terminus chemistry affects the decay events that target *HAC1* mRNA during the Unfolded Protein Response

BA
Hendrix College — 📍 Conway, Arkansas

2013 | 2009

- Biochemistry and Molecular Biology, with Distinction
- Advisor: Andres Caro, PhD. Senior Capstone Project showing key stress response gene expression changes to oxidative stress in liver cells
- Minor in Mathematics; PI: Lars Seme; Project: Newton's method as a fractal chaotic dynamical system

💼 INDUSTRY EXPERIENCE

Senior Scientist, Genomics
Twist Bioscience — 📍 South San Francisco, California

Current | 2022

- Tech Lead of multiple NPIs and custom OEMs; invented and launched products to yield millions of dollars in new revenue, including: *Pan-cancer cfDNA* (v1 & v2), *CNV Controls*, *RNA Fusion Controls*, *Fragmentome Controls*, and RNA-seq
- Built positive team culture; mentored and promoted a report from Senior Research Associate to Scientist; coached reports who served as Tech Leads on new product introductions, increasing revenue. Delivered quality science on deadline by managing research assistants
- Original research and presentations unveiled novel products and underwrote multiple patents for product configuration and biochemical approaches. Gained new customers in RNA standards space with the design and implementation of high-throughput RNA synthesis and pooling
- Analyzed public databases and feedback from alpha testers to optimize design of multiple products; routinely craft custom data analysis pipelines in R and Python; documented analyses using `Rmarkdown`, `Quarto`, and `Jupyter`; maintain git repo of dockerized bioinformatic QC packages for Pan-cancer cfDNA product line
- Generated actionable data for new technology evaluations of a new NGS platform with custom experiments and bioinformatic analyses in Python, R, and SQL to enable faster gene QC in Production. Launched a time-saving gene synthesis change into production, supported by original experimental data. Boosted colleagues in publication-ready plots by coding and distributing on company GitHub the internal package `twistcolorpal`, which automatically styles plots and sets up database connectors to SQL / Snowflake for parameterized `dbplyr` querying. Regularly use R, tidyverse, Python, Polars, AWS `s3`, `Spark`, `PySpark`, and `Sparklyr`, locally and on Databricks. Regularly implements and runs automated code tests

I currently split my time between wet lab and computational activities. I have worked in a variety of roles ranging from HTP strain onboarding to genomics scientist. I like collaborative environments where I can learn from my peers and in turn teach others.

Scientist, Genomics

Current | 2021

Twist Bioscience 📍 South San Francisco, California

- Tech Lead of *Pan-Cancer Reference Standard*, an ISO-13485 synthetic positive control with 458 unique variants among 84 cancer-associated genes at six QC'd VAFs, plus a WT control; launched in Nov of 2021
- Invented, validated, and deployed to production multiple widely-used primer removal methods for DNA standards and high-complexity synthetic dsDNA pools
- Devised and validated precise high-throughput DNA quantification process for accurate pooling. On-boarded droplet digital PCR (ddPCR) system into production; designed and validated custom ddPCR assays for use in production
- Led multiple iterations of custom NGS analysis; refined the QC approach and thresholds for ensuring a contamination-free production process; extensively used data visualization to communicate complex data to cross-functional teams
- Made extensive use of UMI sequencing and created novel method to rigorously quantify library conversion efficiency to evaluate products and reference materials

Scientist I, NGS & NPI-Build

2021 | 2019

Zymergen, Inc. 📍 Emeryville, California

- Achieved a 95% success rate for obtaining a genetic edit by designing and implementing multiple automated high-throughput methods for a non-model microbe: transformation, counterselection, and NGS genotyping
- Determined best methods for genetic manipulation, propagation, and archiving of a non-model microbe through design & execution of complex experiments on lab automation with and without LIMS sample tracking
- Boosted NGS core genotyping success by 45% using data-driven decision making and teaching; guided demanding and diverse internal customers on complex NGS experiments
- Applied statistical methods to screen and optimize a genetic engineering protocol for newly-on-boarded microbe; delivered robust process while working on New Product Introduction team
- Delivered on microbe improvement KPIs by designing and building hundreds of plasmids using modern molecular techniques like Gibson and Golden Gate

🧪 RESEARCH EXPERIENCE

Doctoral Research

2019 | 2014

University of Colorado School of Medicine 📍 Aurora/Denver, Colorado

- Wrote, revised, & published two academic papers on RNA repair & yeast genetics
- Engineered and characterized genetic bypass of essential genes in budding yeast; on-boarded CRISPR/Cas9 for efficient and precise gene knock-in
- Expressed, purified, and used wild-type and mutant recombinant protein in *E. coli* to carry out an RNA modification enzymatic assay
- Optimized custom RNA-seq library protocol; independently planned, executed, troubleshooted RNA modification detection
- Routinely conducted northern blotting, targeted depletion, primer extension, splinted ligation, and other esoteric DNA and RNA experiments

I worked on a few projects during my PhD, and the RNA repair project led me to custom 5'-OH RNA-seq libraries, which inspired my fascination with transcriptomics and bioinformatics.

💡 INTELLECTUAL PROPERTY

Methylation-mediated adapter removal on nucleic acid sequences

3/7/23

Twist Bioscience 📍 South San Francisco, California

- US 63/317,466

Expansion of cfDNA for Libraries

11/12/21

Twist Bioscience 📍 South San Francisco, California

- US Prov. Pat. Ref No 823.102

Working at Twist and Zymergen on new product research requires confidentiality, but public evidence of accomplishments often comes in patent applications. The Legal teams know me well for being a helpful expert in the process.

4/9/21

Libraries for mutational analysis
Twist Bioscience
📍 South San Francisco, California

• US Prov. Pat. Ref No 823.101

3/25/21

Method for counterselection in microorganisms
Zymergen, Inc.
📍 Emeryville, California

• US 2021_0087586 A1

📖 SELECTED PUBLICATIONS

12/21/21

Twist Pan-cancer synthetic reference materials technical guide
Twist Bioscience
📍 South San Francisco, California

• Patrick Cherry & Mike Bocek

2019

Multiple decay events target HAC1 mRNA during splicing to regulate the unfolded protein response
eLife

• Cherry, P., Peach, S., & Hesselberth, J.

2018

Genetic bypass of essential RNA repair enzymes in budding yeast
RNA

• Cherry, P., White, L., York, K., & Hesselberth, J.

I communicate my results clearly, both in writing and in live presentations. I enjoy writing research papers, but my career has required more tech notes and app notes recently.

📽 SELECTED PRESENTATIONS & TALKS

2/6/24

Twist pan-cancer reference standard V2: Enhanced precision and reduced errors in ctDNA analysis
Advances in Genome Biology and Technology
📍 Orlando, Florida

4/16/23

Twist pan-cancer synthetic RNA fusion control for assay development
American Association for Cancer Researchers
📍 Orlando, Florida

2/7/23

Use of synthetic CNV fragments to mimic copy number alterations for ctDNA reference standards
Advances in Genome Biology and Technology
📍 Hollywood, Florida

4/12/22

Twist pan-cancer synthetic reference materials for cell-free DNA (cfDNA) assay development
American Association for Cancer Researchers
📍 New Orleans, Louisiana

7/13/21

Molecular Methods Meet the Standards: Or how I learned to stop worrying and love UV-quantification
Twist R&D Meeting
📍 South San Francisco, CA

6/16/20

R use at Zymergen
Z-Tech Talk
📍 Emeryville, CA

4/20/20

Data-driven troubleshooting of NGS experiments
Data Science Talk
📍 Emeryville, CA

I give audience-centered presentations by adapting on the fly and over time to the venue and occasion. I like to *transfer knowledge* by giving methods/best practices talks whose slides can also serve as documentation.