# 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 and biotechnology.

## EDUCATION

2019 | 2013

**PhD**

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

- 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

2013 | 2009

**BA**

Hendrix College — Conway, Arkansas

- 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

Current | 2022

**Senior Scientist**

Twist Bioscience — South San Francisco, California

- Tech Lead of multiple reference control NPIs and custom OEMs; collaborated cross-functionally to launch quality products; includes the *Pan-cancer RNA Fusion Controls*, *Fragmentome Calibration Controls*, *CNV Controls*, *Pan-cancer cfDNA v2*, and RNA-seq.
- Mentored a direct report from Senior Research Associate to Scientist to serving as a Tech Lead on new product introductions. Managed research assistants to produce quality science on deadline.
- Original research led to multiple outside presentations and patent protection of product configuration and biochemical methods. Designed and implemented high-throughput RNA synthesis and pooling.
- Routinely craft custom data analysis pipelines in R and Python; documented analyses using `Rmarkdown`, `Quarto`, and `Jupyter`; maintain dockerized git / Github bioinformatic QC packages for Pan-cancer cfDNA standard and the Pan-cancer RNA Fusion Controls; used public databases and feedback from alpha testers to design configuration of multiple products.
- Led new technology evaluation of a new NGS platform with custom experiments and bioinformatic analyses in Python, R, and SQL to enable faster gene QC in Production. Also led ancillary experiments to speed up synthetic gene production. Coded, implemented, and distributed on company GitHub an internal package, `twistcolorpal`, that automatically adds Twist-brand colors to `ggplot2` 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 with `pytest` and `testthat`.

## CONTACT


- pcherry [at] pm dot me
- upon request
- Senior Scientist | Genomics
- Twist Bioscience
- San Francisco, California
- pdcherry.github.io
- github.com/pdcherry
- linkedin.com/in/p-cherry
- United States Citizen


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.

*Last updated on 2024-03-21.*

*Data-driven CV made in R using pagedown.*

Current | 2021

**Scientist**

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.
- Designed, implemented, & validated widely-used primer removal procedure for DNA standards and more.
- 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

2021 | 2019

**Scientist I**

Zymergen, Inc. — Emeryville, California

- Designed and implemented an automated high-throughput genotyping assay
- Designed & carried out complex experiments on automation with and without LIMS sample tracking
- Supported a company-wide NGS core under high demand from diverse groups with complex needs using data-driven decision making and teaching
- Used 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
- Built hundreds of plasmids using modern molecular cloning techniques like Gibson and Golden Gate

## RESEARCH EXPERIENCE

2019 | 2014

**Doctoral Research**

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.

2013 | 2012

**Undergraduate Research Assistant**

Lab of Dr. Andres Caro, Hendrix College — Conway, Arkansas

2012 | 2012

**Summer Undergraduate Research Fellowship**

Lab of Dr. Michael Shiloh, UT Southwestern Medical Center — Dallas, Texas

2011 | 2010

**Research Assistant**

Lab of Dr. Joy Sturtevant, Louisiana Health Sciences Center — New Orleans, Louisiana

## INTELLECTUAL PROPERTY

Working at Twist and Zymergen on

3/7/23 **Methylation-mediated adapter removal on nucleic acid sequences**
Twist Bioscience — South San Francisco, California
• US 63/317,466

11/12/21 **Expansion of cfDNA for Libraries**
Twist Bioscience — South San Francisco, California
• US Prov. Pat. Ref No 823.102

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

4/22/22 **Characteristics and specificity of the wild-type / 0% VAF reference material**
Twist Bioscience — South San Francisco, California
• Patrick Cherry & Mike Bocek

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.

## 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
• Lydia Bonar, *Patrick Cherry*, Michael Bocek, Shawn Gorda, Derek Murphy, and Esteban Toro

11/19/23 **High sensitivity detection of specific ultra low-frequency somatic mutations for minimal residual disease (MRD) monitoring**
International Society of Liquid Biopsy Annual Congress — Madrid, Spain
• Tina Han, Tong Liu, Michael Bocek, *Patrick Cherry*, Shawn Gorda, Nairi Pezeshkian, Dan Nasko, Po-Yuan Tung, Derek Murphy, and Esteban Toro

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.

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.

4/16/23 **Twist pan-cancer synthetic RNA fusion control for assay development**
American Association for Cancer Researchers — Orlando, Florida
- Patrick Cherry, Jason Corwin, Yu Cai, Kit Fuhrman, Jean Challacombe, Derek Murphy, Esteban Toro

4/19/23 **High sensitivity detection of specific ultra low-frequency somatic mutations for minimal residual disease (MRD) monitoring**
American Association for Cancer Researchers — Orlando, Florida
- Tong Liu, Michael Bocek, *Patrick Cherry*, Shawn Gorda, Jean Challacombe, Derek Murphy and Esteban Toro

4/19/23 **An end-to-end workflow for accurate methylation detection**
American Association for Cancer Researchers — Orlando, Florida
- Lydia Bonar, Kristin Butcher, Michael Bocek, Holly Corbitt, Bryan Hoglund, Cibelle Nassif, *Patrick Cherry*, Derek Murphy, Jean Challacombe, Esteban Toro

4/10/23 **Colorado RNA Club Industry Session**
Colorado RNA Club — Boulder, Colorado

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
- Jason Corwin, *Patrick Cherry*, Shawn Gorda, Michael Bocek, Jean Challacombe, Derek Murphy, Esteban Toro

2/7/23 **Methylation Controls to detect for methylation level quantification in the Twist Targeted Methylation Sequencing workflow**
Advances in Genome Biology and Technology — Hollywood, Florida
- Kristin Butcher, Michael Bocek, *Patrick Cherry*, Jean Challacombe, Esteban Toro

5/26/22 **Efficient, high sensitivity detection of oncogenic variants with UMIs and target enrichment**
European Human Genetics Conference — Vienna, Austria
- Michael Bocek, Lydia Bonar, Jean Challacombe, Richard Gantt, *Patrick Cherry*, Rebecca Liao, Derek Murphy and Esteban Toro

4/12/22 **Twist pan-cancer synthetic reference materials for cell-free DNA (cfDNA) assay development**
American Association for Cancer Researchers — New Orleans, Louisiana

3/17/22 **Twist reference material products: current methods and future applications**
Twist R&D Symposium — South San Francisco, CA

4/5/22 **Pan-cancer Reference Standard: Methods in Automation & Future Needs**
Twist Automation Group Meeting — South San Francisco, CA

2/15/22 **Pan-cancer Reference Standard: Methods & Lessons from NPI & QC**
Twist R&D Meeting — South San Francisco, CA

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

3/27/20 **NGS Sample Preparation Deep-Dive**
NGS Technical Talk Series — Emeryville, CA

4/10/21 **Colorado RNA Club Industry Session**
Colorado RNA Club — Boulder, Colorado

2019 **RNA terminus chemistry potentiates decay events that target HAC1 mRNA during the unfolded protein response**
Thesis Defense Seminar — Aurora, Colorado

2019 **RNA modification and decay regulates the unfolded protein response**
Rocky Mountain Yeast Meeting Poster — Fort Collins, Colorado

2018 **What the unfolded protein response teaches us about RNA decay**
Bolie Scholar Talk, Molecular Biology Program Retreat — Winter Park, CO

2018 **Genetic bypass of essential yeast RNA repair enzymes**
Rocky Mountain Yeast Meeting Poster — Golden, Colorado

2017 **RNA processing regulates the unfolded protein response**
CSHL: mRNA Processing Meeting Talk — Cold Spring Harbor, New York

2017 **Genetic bypass of essential yeast RNA repair enzymes**
Molecular Biology Program Update Talk — Aurora, Colorado

2017 **Genetic bypass of essential yeast RNA repair enzymes**
Rocky Mountain Yeast Meeting Poster — Boulder, Colorado

2016 **RNA processing regulates the unfolded protein response**
RNA Club Talk — Boulder, Colorado

2016 **RNA Healing and Destruction**
Molecular Biology Program Update Talk — Aurora, Colorado

2016 **RNA processing regulates the unfolded protein response**
Rocky Mountain Yeast Meeting Poster — Fort Collins, Colorado

2015 **Turnover of endonucleolytic products of No-Go mRNA decay**
RNA Stability Meeting — Estes Park, Colorado

2015 **RNA 5?-kinase-mediated co-translational mRNA decay**
Molecular Biology Program Update Talk — Aurora, Colorado

2015 **RNA 5?-kinase-mediated co-translational mRNA decay**
Rocky Mountain Yeast Meeting Poster — Aurora, Colorado

2014 **RNA 5?-kinase-mediated co-translational mRNA decay**
Rocky Mountain Yeast Meeting Poster — Boulder, Colorado

2013 **Coordinated upregulation of antioxidant protection and mitochondrial DNA biosynthesis in liver cells by oxidative stress**
Senior Undergraduate Capstone Research Talk — Conway, Arkansas

While I've not held a role with a "manager" title, all Scientist positions I've accepted have had formal report management responsibility. I take managing and mentoring seriously and emphasize trust, learning, and growth with my reports.

## TRAINEES & DIRECT REPORTS

Current | 2022

**Derek Cai, BS, University of California San Diego, Research Associate I**
Twist Bioscience
South San Francisco, California

Current | 2021

**Lydia Bonar, MS, Johns Hopkins University, Scientist**
Twist Bioscience
South San Francisco, California

2022 | 2021

**Alonzo Lee, BS, University of California Santa Cruz, Scientist**
Twist Bioscience
South San Francisco, California

2021 | 2020

**Kaisle Hill, BA, University of California Berkeley, Senior Research Associate**
Zymergen, Inc.
Emeryville, California

2017

**Rachel A Jones, MS, University of Arizona, Postdoctoral Fellow**
University of Colorado School of Medicine
Aurora/Denver, Colorado

2016

**Laura K White, MS, Biotechnology, Johns Hopkins University, Postdoctoral Fellow**
University of Colorado School of Medicine
Aurora/Denver, Colorado

2016 | 2014

**Haven Himmighoefer, Undergraduate, University of Colorado Denver**
University of Colorado School of Medicine
Aurora/Denver, Colorado

2015

**Leslie Aranda, Undergraduate, University of California Riverside**
University of Colorado School of Medicine
Aurora/Denver, Colorado