

Thomas Murphy

Corvallis OR, 97330 (971) 272 2589

murphtho@oregonstate.edu ♦ tmbio.me

EDUCATION

Oregon State University: B.S. Biology | March 2022

Option: Genetics, GPA: 3.68

Minor: Chemistry, GPA: 3.82

Capstone Project: "Phosphorylation on residue serine-88 of DYNLL1 plays central role in functional regulation"

RESEARCH EXPERIENCE

Oregon State University: Department of Statistics | Jan. 2022 - March 2022

RNA-Seq Statistical Analysis

- Examined the biological and statistical backgrounds of ribonucleic acid sequencing.
- Accessed the National Center for Biotechnology Information's Sequence Read Archive(SRA) repository to obtain raw sequencing data.
- Transformed and manipulated raw SRA sequencing data.
- Evaluated and visualized data using various computational methods, such as:
 - Linux Shell scripting
 - Open-source Galaxy suite processing
 - R and Python programming

Oregon State University: Dept. of Biochem. and Biophysics | Sep. 2019 - Jun. 2020

Senior Capstone Project

- Designed and implemented a collaborative study to investigate the effects of DYNLL1 phosphorylation on cellular regulation and transportation.
- Identified important amino acid residues suggested to be targets of regulatory kinases.
- Performed non-canonical amino acid insertion techniques to engineer and produce novel recombinant proteins.
- Cultured and maintained *Escherichia coli* TOP10ΔserB cell lines.

- Isolated and examined recombinant DYNLL1_{pSer-88} for conformational signatures of successful phosphoserine incorporation and binding affinity information using:
 - Immobilised Metal Affinity Chromatography
 - Discontinuous Native PAGE
 - Phos-Tag™ Acrylamide Gel Electrophoresis
 - Circular Dichroism (CD) Spectroscopy

TEACHING EXPERIENCE

Oregon State University: Biochemistry Club | Sep. 2018 - July 2019

Undergraduate Mentor

- Facilitated weekly study sessions for students, clarifying complex concepts and supporting student comprehension of course materials.
- Led monthly journal club discussions, promoting active learning and encouraging collaboration to enhance understanding.
- Conducted individual check-ins with students to offer guidance, feedback, and support as needed.

Oregon Youth Soccer Association (OYSA) : Training Clinic | Jun. 2011 - Aug. 2011

Coaching Assistant

- Provided one-on-one instruction to players to enhance their skills and increase their confidence.
- Demonstrated strong leadership and interpersonal skills, fostering a positive and supportive learning environment.
- Contributed to the overall success of the summer soccer clinic by consistently displaying a positive attitude and strong work ethic.

LABORATORY SKILLS

Molecular Biology:

- Synthesis, Purification, Isolation, and Characterization of proteins using:
Buffer and Stock Solution Formulation | SDS-PAGE Analysis | Western Blotting | Immobilised Metal Affinity Chromatography | Enzyme-Linked Immunosorbent Assay (ELISA) | *Escherichia coli*. Recombinant Protein

Expression | Micropipetting Techniques | Microfluidization | Centrifugation | Bradford Protein Assays | NanoDrop Spectrophotometry | Discontinuous Native PAGE | Tandem Mass Spectrometry (MS/MS) | Circular Dichroism (CD) Spectroscopy | Infrared (IR) spectroscopy

- Genomic and Transcriptomic Analyses of Nucleic Acids including:
Assembly-PCR | Reverse-Transcriptase (RT)-PCR | Quantitative PCR (qPCR) | Southern Blotting | RNA blotting | Primer Design | Plasmid Vector Design | Library Construction | Pulse-Field Gel Electrophoresis | RNA-Seq Analysis | CRISPR-CAS9 Engineering | Homologous Recombination | Non-Homologous End Joining | Targeted Mutagenesis
- Maintaining and Manipulating Microbiological Specimens using:
Dissecting and Compound Microscopes | Simple and Differential Staining | Sterile Inoculation and Storage Techniques | Autoclaving | Sample Phenotyping | Environmental Sampling | Sample Isolation | Culture Media Preparation | Bacterial Density Quantification | Calcium Chloride Transformation | Electroporation | Fine Needle Injections | Embryo Maneuvering (*Zebrafish-Danio rerio*) | Environmental Mutagenesis

Chemistry and Physics:

- Purification, Isolation and Characterization of organic molecules using:
Solid-Liquid Extraction | Melting Point Determination | Recrystallization | Liquid-Liquid Extraction | Fractional Distillation | Titration | Thin Layer Chromatography (TLC) | Gas-Liquid Chromatography (GC)
- Synthesis of organic compounds using reactions such as:
Base-catalyzed aldol condensation | Saponification | Grignard reactions | Benedict's Reagent testing | Acid-Catalyzed Dehydration | Dehydrohalogenation

General Practices:

- Biohazardous and Chemical Hazard Safety:
Spill clean-up | Fume Hood operation | Correct Personal Protective Equipment (PPE) usage | ACS Safety Data Sheet generation | Hazardous chemical/biological disposal training | Emergency device training (fire extinguisher, shower, eye wash, etc.)
- Miscellaneous:

Laboratory notebook maintenance | Sterilization cleaning procedures | Basic equipment maintenance | Tracking and maintaining significant units | Acid bath washing

PROFESSIONAL SKILLS

Bioinformatics:

- Experienced in computational -Omics data workflows and systems including:
 - Accessing numerous databases like NCBI, ENCODE, REACTOME, etc.
 - Managing diverse file formats (BAM, SAM, FASTA/Q, BED, CSV, etc.)
 - Manipulating and analyzing various data types using Biopython, BLAST Galaxy-suite, UCSC Genome Browser, SnapGene, Linux command line, Geneious Prime.
 - Performing common computational techniques such as read processing, functional annotations, genome assembly, gene prediction, read mapping, sequence alignments (basic and multiple), motif finding, probability matrices (MEME), RNA target prediction, GO enrichment analysis.
- Competent in protein prediction, interactions, regulations, and visualization programs including:
 - Protein-protein (or domain-domain) interaction using STRING, and DOMINE.
 - Building protein/gene regulation models using COPASI.
 - Visualize 3D molecular protein structure using PyMOL and UCSF Chimera.
 - Domain and protein prediction using EMBL-EBI and AlphaFold v2./CASP15

Statistical Analysis:

- Conceptual and practical understanding of various experimental deliberations such as:
 - Experimental design | Sampling design | Confidence vs Power concerns | Negative and Positive control considerations | Error (type 1,2, FDR, FWER) management
- Proficient in a variety of statistical methodologies including:

Cluster Analysis (Partitional and Hierarchical Clustering) | Finite mixture models (FMMs) | Principal Component Analysis (PCA) | Principal component regression (PCR) | T-testing | Analysis of Variance(ANOVA) | Single and Multivariate Regression | Poisson Regression | Regression Tree (Recursive partitioning) | Model Selection | Akaike/Bayesian Information Criterion(AIC/BIC) | Multiple Comparison Corrections (Bonferroni's, Benjamini-Hochberg/Yekutieli procedures) | Variable Selection (Subset Selection, Ridge, and Lasso) | Akaike/Bayesian Information Criterion(AIC/BIC)

- Practiced in data visualization using R and python including:
Heatmap generation | Volcano plots | Dendrograms | Single and double axis plots | Tables | Phylogenetic Trees | Dot and Scatter Plots | Pie Charts | Bubble Charts

Miscellaneous:

Dedicated Server and Database Management | Web Development
Experience | First Responder Training

RELEVANT COURSEWORK

Molecular Biology:

Cell and Molecular Biology (BB 314) | General Microbiology + Lab (MB 302,303) | Molecular Biology Laboratory (BB 315) | Bacterial Molecular Genetics (MB 310) | Embryology and Development (Z 425) | Functional Genomics (BOT 460) | Comparative Genomics(BOT 475) | Advanced Molecular Genetics (BB 486) | Microbial Biotechnology (MB 456)

Bioinformatics:

Introduction to Sequence Analysis (BB 345) | Introduction to Genome Biology (BDS 474) | Applied Bioinformatics (BB 485)

Chemistry:

General Chemistry Series + Lab (CH 231,232,233) | Organic Chemistry Series + Lab (CH 331,332,337) | Biochemistry Series +Lab (BB 450,451,494) | Environmental Chemistry (CH 390)

Statistics:

Introduction to Statistical Methods (ST 351) | Methods of Data Analysis
Series (ST411,412,413) | Statistical Genomics (ST 592)

Ecology:

Ecology (BI 370) | Evolution (BI 445) | Invertebrate Biology + Lab (Z 361,362) |
Population Biology (BI 483)