

Daniel A. Cuevas

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RESEARCH INTERESTS

I aim to furnish my analytical skill set with education and extensive, collaborative research in advanced mathematics, statistics, biology, and bioinformatics. The primary areas of focus in my doctoral curriculum are to develop bioinformatics tools, algorithms, and data visualization methods concentrated on DNA sequence analysis and bacterial metabolic modeling. These can be comprehensively applied toward various areas of biological research where data aggregation and investigation is required to answer scientific queries.

GRADUATE RESEARCH

Edwards Bioinformatics Lab
San Diego State University
5500 Campanile Drive, San Diego, CA 92182

Mentor: Professor Robert Edwards

EDUCATION

San Diego State University with Claremont Graduate University
Ph.D., Computational Biology
Cumulative GPA: 3.85

08/12 – 12/17

San Diego State University
B.S., Computer Science
Major GPA: 3.89 | Cumulative: 3.23

08/05 – 05/11

PROFESSIONAL EXPERIENCE

Graduate Research Assistant
Robert Edwards Bioinformatics Lab, San Diego State University
Advisor: Professor Robert Edwards

07/12 – Present

- Generated a diverse set of bacterial genome-scale metabolic models to investigate common and unique difficulties in metabolism-based annotations
- Developed automated pipeline named PMAnalyzer that performs logistic model fitting onto bacterial growth curves using Python's SciPy optimization libraries and Pandas data structures, eliminating manual execution and increasing throughput
- Developed genome-scale metabolic model software named PyFBA that performs Flux-Balance Analysis and model reconciliation algorithms to improve bacterial metabolism accuracy and robustness
- Led a team of student researchers to produce a bacterial database and API that consist of a variety of data, including taxonomic-based phenotypes, experimental observations, and model-predicted results
- Performed various statistical and machine learning techniques (e.g., regressions, SVM, random forest) on numerous biological data sets, such as DNA/amino acid sequences, mass spectroscopy-based metabolomics data, optical density biomass measurements, and DNA microarray expression levels, and other quantitative biological/environmental measurements

Software Engineer and Bioinformatician
Life Technologies, Ion Torrent R&D
Supervisor: Ellen Beasley

09/11 – 07/12

- Performed deep analysis on sequence quality and mapping statistics that identified deficiencies in the sequencing protocols and the AmpliSeq primer design algorithm
- Trained team members to use bioinformatics tools for investigations within various aspects of the Ion Torrent technology
- Exercised interdisciplinary skills of molecular biology and bioinformatics to assess the effectiveness of library preparation procedures in producing longer read lengths, higher quality sequences, and other far reaching goals
- Developed a multi-site accessible web-interface for experimental results and analysis that was absorbed as an integral tool for comparative studies throughout the company

Molecular Biology and Bioinformatics Internship
Life Technologies, Ion Torrent R&D and SOLiD Collaborations
Supervisor: Marie Callahan

05/11 – 08/11

- Performed multiple studies to measure the quality of several sequencing experiments by focusing on the performance of various sequencing polymerase mutants
- Led projects through supervision of sequencing and mapping runs to produce variant calls, mapping statistics, and mapping quality summaries for Collaborations group
- Assisted team members with scheduling sequencing runs, initializing PGM instruments, and resolving server-related issues to improve the flow of experiments

Undergraduate Research Assistant
Robert Edwards Bioinformatics Lab, San Diego State University
Advisor: Professor Robert Edwards

05/09 – 05/11

- Constructed a search hash-algorithm used to accurately identify DNA sequence similarity among multiple files
- Collaborated with a group member in developing an Android mobile application that effectively extracted metagenomic information from a DNA sequence file
- Developed a social network web application to access and distribute metagenomic data while leveraging the network's facilities to connect with colleagues and collaborators

AWARDS

ARCS Foundation Scholar, Two Years
 ARCS San Diego Chapter

09/15-05/17

2014 GEN TEN Award
 Genetic Engineering and Biotechnology News Publisher

06/14

Graduate S-STEM Scholarship, Two Years
 National Science Foundation via SDSU Computational Science Research Center

01/14 –01/16

11th Annual Rocky Mountain Bioinformatics Conference Poster Prize
 F1000Research

12/13

Statistical Biomedical Informatics Scholarship, Two Semesters
 Biomedical Informatics Research Center, San Diego State University

08/12 – 05/13

NIH New Interdisciplinary Workforce Fellow
 Computational Science Research Center, San Diego State University

07/09 – 07/10

Dean's Honors List, Six Semesters
 San Diego State University

08/08 – 05/11

MEMBERSHIPS

PEER REVIEWED PUBLICATIONS

Boling, L., **Cuevas, D.**, McNair, K., Smurthwaite, C., Sanchez, S., Kang, H.S., and Rohwer F. (2017). Dietary Antimicrobials and Prophage Inducers – Towards Landscaping of the Human Gut Microbiome. (In preparation).

Kang, H.S., McNair, K., **Cuevas, D.**, Bailey, B., Segall, A.M., and Edwards, R.A. (2017). Prophage genomics reveals patterns in phage genome organization and replication. (In submission).

Silva, G.G.Z., Haggerty, J.M., **Cuevas, D.A.**, Doane, M., Dinsdale, E.A., Dutilh, B.E., and Edwards, R.A. (2017). Ecological Implications of Metagenomics Data Analysis. (In submission).

Sczyrba A., et al. (2017). Critical Assessment of Metagenome Interpretation – a benchmark of computational metagenomics software. (In submission).

Cuevas, D.A., and Edwards, R.A. (2017). PMAalyzer: a new web interface for bacterial growth curve analysis. *Bioinformatics*.

Cuevas, D. A., Edirisinghe, J., Henry, C. S., Overbeek, R., O’Connell, T. G., and Edwards, R. A. (2016). From DNA to FBA: How to Build Your Own Genome-Scale Metabolic Model. *Systems Microbiology*, 907.

Sanchez, S.E., **Cuevas, D.A.**, Rostron, J.E., Liang, T.Y., Pivaroff, C.G., Haynes, M.R., Nulton, J., Felts, B., Bailey, B.A., Salamon, P., et al. (2015). Phage Phenomics: Physiological Approaches to Characterize Novel Viral Proteins. *Journal of Visualized Experiments*. e52854.

Cuevas, D.A., Garza, D., Sanchez, S.E., Rostron, J., Henry, C.S., Vonstein, V., Overbeek, R.A., Segall, A., Rohwer, F., Dinsdale, E.A., et al. (2014). Elucidating genomic gaps using phenotypic profiles. *Fl000Research*. (In review).

Lim, Y.W., **Cuevas, D.A.**, Silva, G.G.Z., Aguinaldo, K., Dinsdale, E.A., Haas, A.F., Hatay, M., Sanchez, S.E., Wegley-Kelly, L., Dutilh, B.E., et al. (2014). Sequencing at sea: challenges and experiences in Ion Torrent PGM sequencing during the 2013 Southern Line Islands Research Expedition. *PeerJ* 2, e520.

Dutilh, B.E., Thompson, C.C., Vicente, A.C., Marin, M.A., Lee, C., Silva, G.G., Schmieder, R., Andrade, B.G., Chimetto, L., **Cuevas, D.**, et al. (2014). Comparative genomics of 274 *Vibrio cholerae* genomes reveals mobile functions structuring three niche dimensions. *BMC Genomics* 15, 654.

Silva, G.G.Z., **Cuevas, D.A.**, Dutilh, B.E., and Edwards, R.A. (2014). FOCUS: an alignment-free model to identify organisms in metagenomes using non-negative least squares. *PeerJ* 2, e425.

Disz, T., Akhter, S., **Cuevas, D.**, Olson, R., Overbeek, R., Vonstein, V., Stevens, R., and Edwards, R.A. (2010). Accessing the SEED Genome Databases via Web Services API: Tools for Programmers. *BMC Bioinformatics* 11, 319.

TALKS AND POSTER PRESENTATIONS

Metabolic model and data-driven exploration linking genotypes to phenotypes
 (Poster) San Diego State University Student Research Symposium, San Diego, CA

03/17

From DNA to FBA: how to build your own genome-scale metabolic model (P) SDSU Applied Computational Science and Engineering Student Support, San Diego, CA	04/16
From DNA to FBA: how to build your own genome-scale metabolic model (Talk) San Diego State University Student Research Symposium, San Diego, CA	03/16
Phenotyping Diverse Bacteria for Metabolic Network Reconstruction (P) General Meeting of the American Society for Microbiology, New Orleans, LA	06/15
Phenotyping Diverse Bacteria for Metabolic Network Reconstruction (P) SDSU Applied Computational Science and Engineering Student Support, San Diego, CA	04/15
Phenotyping Diverse Bacteria for Metabolic Network Reconstruction (T) San Diego State University Student Research Symposium, San Diego, CA	03/15
High-Throughput Phenotype Profiling for Bacterial Flux-Balance Model Optimization (T) Biotechnology Industry Organization International Convention, San Diego, CA	06/14
High-Throughput Phenotype Profiling for Bacterial Flux-Balance Model Optimization (P) General Meeting of the American Society for Microbiology, Boston, MA	05/14
High-Throughput Phenotype Profiling for Bacterial Flux-Balance Model Optimization (T) San Diego State University Student Research Symposium, San Diego, CA	03/14
High-Throughput Phenotype Profiling for Bacterial Flux-Balance Model Optimization (P) Southern California Systems Biology Conference, Irvine, CA	01/14
High-Throughput Phenotype Profiling for Bacterial Flux-Balance Model Optimization (T & P) Rocky Mountain Bioinformatics Conference, Snowmass, CO	12/13
Measuring Growth Quality of Bacteria Using Phenotypic Microarrays (P) San Diego Microbiology Group All-day Meeting, San Diego, CA	05/13
Characterizing Phenotypic Properties of Unexplored Viral Genes (T) San Diego State University Student Research Symposium, San Diego, CA	03/13
Compiling Genome Metadata for Comparative Analysis (T) Rocky Mountain Bioinformatics Conference, Snowmass, CO	12/12
Rapid Sequence Searching Using Hashing (T) San Diego State University Student Research Symposium, San Diego, CA	03/11
Real-Time Metagenomics (P) General Meeting of the American Society for Microbiology, San Diego, CA	05/10
Real-Time Metagenomics (P) San Diego Microbiology Group All-day Meeting, San Diego, CA	05/10
Real-Time Metagenomics (P) SDSU Applied Computational Science and Engineering Student Support, San Diego, CA	03/10
Real-Time Metagenomics (T) San Diego State University Student Research Symposium, San Diego, CA	03/10

LECTURES

Guest lecture at San Diego State University. Course: BIOL549 - Microbial Genetics and Physiology
Flux-balance analysis using genome-scale metabolic models

11/16

Summer workshop at San Diego State University
Introduction to Python programming for microbiology scientists

Summer 2016