SEAN R. HACKETT

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Summary of Qualifications:
• Investigates questions in systems biology and biochemistry from experimentally-driven, computational perspectives
• Analyzes genomic datasets using statistically rigorous methods and integrates resulting data in principled ways
• Bridges the gap between genetic and physiological variation
• Has a deep understanding of biology and biochemistry

Skills: Programming: R and python, statistics, flux inference, metabolomics, proteomics, systems biology, statistical genetics, optimization, bioinformatics, biochemistry

EDUCATION

Princeton University — Princeton, New Jersey

Ph.D., Quantitative and Computational Biology — November 2015

• Thesis: *Quantitative Analysis of Metabolism and Protein Abundance Using Integrative 'Omics*

• DOE Office of Science Graduate Fellowship (SCGF), Biological and Environmental Research: 09/2012 - 09/2015

Cornell University — Ithaca, New York

B.S., Biological Sciences — June 2006

• Thesis: *Candidate gene analysis of German shepherd dogs to identify genes contributing to arrhythmogenesis*

• Concentration in Genetics and Development
• *Magna Cum Laude* with Distinction in Research

RESEARCH

POSTDOCTORAL ASSOCIATE

Princeton University, Lewis-Sigler Institute — Princeton, New Jersey — Dec 2015 - Present

• Mentor: John Storey, Professor of Genomics; Director of Center for Statistics and Machine Learning
• Utilize methods from machine learning to identify latent variables affecting high-dimensional sports data.
• Develop methods for interactive visualization of networks and for results from topic modeling.

GRADUATE FELLOW

Princeton University, Quantitative and Computational Biology — Princeton, New Jersey — Sep 2010 - Nov 2015

• Adviser: Josh Rabinowitz, Professor of Chemistry and Genomics
• Developed scalable techniques for combining metabolomics, proteomics and fluxes to provide novel insight into how metabolism is controlled. This allowed me to identify 3 novel instances of metabolic regulation and to dissect how metabolite and enzyme concentrations jointly drive flux.
• Identified a pattern of metabolite changes in primary human pancreatic tumors leading to the discovery that intact extracellular proteins are a major source of nutrients in cancer.
• Contributed to the design, execution and analysis of multiple 'omic datasets using both existing and novel approaches.
• Helped secure DOE grant DE-SC0012461, based on my thesis research.

RESEARCH SPECIALIST

Cornell University, Molecular Biology and Genetics — Ithaca, New York — June 2006 - Sep 2010

• Mentor: Andy Clark, Professor of Population Genetics
• Developed high-throughput experimental methods for quantifying natural variation in Drosophila metabolism (e.g. flight, gas-exchange and enzyme activities).
• Generated an R pipeline for reproducible data analysis using computational techniques such as Hidden Markov Models.

PUBLICATIONS

• Sean R. Hackett, Vito R.T. Zanotelli, Wenxin Xu, Jonathan Goya, Junyoung O. Park, David H. Perlman, Patrick A. Gibney, David Botstein, John D. Storey, and Joshua D. Rabinowitz. *Systems-level analysis of mechanisms controlling yeast metabolic flux.* Science (in review).

• Jennifer K. Grenier, J. Roman Arguello, Margarida Cardoso Moreira, Srikanth Gottipati, Jaaved Mohammed, Sean R. Hackett, Rachel Boughton, Anthony J. Greenberg, and Andrew G. Clark. *Global Diversity Lines - A five-continent reference panel of sequenced Drosophila melanogaster strains.* G3, 5(4), 2015.

• Jurre Kamphorst, Michel Nofal, Cosimo Commisso, Sean R. Hackett, Wenyun Lu, Elda Grabocka, George Miller, Jeffrey Drebin, Matthew Vander Heiden, Dafna Bar-Sagi, Craig Thompson, Josh Rabinowitz. *Human pancreatic cancer tumors are nutrient poor and the tumor cells actively scavenge extracellular protein.* Cancer Research, 75, 2015.

• Robin Mathew, Sinan Khor, Sean R. Hackett, Joshua D. Rabinowitz, David H. Perlman, and Eileen White. *Functional role of autophagy-mediated proteome remodeling in cell survival signaling and innate immunity.* Molecular Cell, 55(6), 2014.

• Jeffrey S. Bruenig, Sean R. Hackett, Joshua D. Rabinowitz, and Leonid Kruglyak. *Genetic basis of metabolome variation in yeast.* PLoS Genetics, 2013.

• Cosimo Commisso, Shawn M. Davidson, Rengin G. Soydaner-Azeloglu, Seth J. Parker, Jurre J. Kamphorst, Sean Hackett, Elda Grabocka, Michel Nofal, Jeffrey A. Drebin, Craig B. Thompson, Joshua D. Rabinowitz, Christian M. Metallo, Matthew G. Vander Heiden, and Dafna Bar-Sagi. *Macropinocytosis of protein is an amino acid supply route in Ras-transformed cells.* Nature, 497, 2013.

• Anthony J. Greenberg, Sean Hackett, Lawrence G. Harshman, and Andrew G. Clark. *Environmental and genetic perturbations reveal different networks of metabolic regulation.* Molecular Systems Biology, 7:563, 2011.

• Anthony J. Greenberg, Sean Hackett, Lawrence G. Harshman, and Andrew G. Clark. *A hierarchical bayesian model for a novel sparse partial diallel crossing design.* Genetics, 185(1):361-373, June 2010.

• Sean Hackett, SW Jung, E Kirkness, J Cruickshank, K L Vikstrom, N S Moise, and T M Gunn. *Identification and characterization of canine microsatellite markers in cardiac genes.* Animal Genetics, 38(1):89-91, February 2007.

• W Liu, Sean Hackett, J Cruickshank, K L Vikstrom, N S Moise, and T M Gunn. *Canine microsatellites associated with genes implicated in cardiac development and function.* Animal Genetics, 37(1):87-88, February 2006.

TALKS

• 2016 Genomic Sciences Program Annual PI Meeting (March 7^{th} 2016).
Systems-Level Analysis of Mechanisms Controlling Yeast Metabolic Flux

• Agilent Emerging Omics Research Tour: 'Omics and Integrated Biology (October 1^{st} 2014).
Exploring Metabolic Regulation Via Integrative 'Omics.

• 2014 Yeast Genetics Meeting (July 30^{th} 2014)
Plenary Talk: Environmental Sensing Networks
An Integrated 'Omics Approach to Large-Scale Quantitative Analysis of Cellular Metabolic Regulation

• International Conference on Systems Biology (ICSB 2013 - September 3^{rd} 2013)
Parallel Session: Complex genetic traits
Genetic Basis of Metabolome Variation in Yeast

TEACHING EXPERIENCE AT PRINCETON

INSTRUCTOR	Statistical Programming with R workshop.	March 2015
	Statistical Programming with R workshop.	October 2014
TEACHING ASSISTANT	An integrated, mathematically and computationally sophisticated introduction to biochemistry, molecular biology, genetics, genomics and evolution (undergraduate course taught by David Botstein, Eric Weichaus & Peter Andolfatto)	Fall 2012
	Advanced Statistics for Biology (graduate course taught by John Storey)	Spring 2012