

Curriculum Vitae

Name: Benjamin J. Cole
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Education and Training

Certificate in Data Science, University of California, Berkeley Extension, *January, 2019*

Postdoctoral Research, DOE-Joint Genome Institute (2013-2016). Advisor: Dr. Axel Visel.

- Led a project to identify plant microbial colonization genes using a functional genomics screen with Dr. Jeffrey Dangl at the University of North Carolina, Chapel Hill. Developed a novel sequence-based colonization bioassay leveraging Random-Barcoded TnSeq (RB-TnSeq) to profile all *Pseudomonas simiae* genes for their contribution to thrive on *Arabidopsis thaliana* roots.

Postdoctoral Research, U. C. San Diego/U. Southern California 2011-2013. Advisor: Dr. Steve Kay.

- Participated in a collaborative study with Dr. Samuel Hazen (UMass Amherst), Dr. Todd Mockler, and Dr. John Mullet (Texas A&M, Austin), to improve cereal grasses for biofuels production as part of a DOE-funded program.
- Initiated studies of growth regulation by the circadian clock in *Brachypodium distachyon* using quantitative gene expression profiling (RNA-seq) and live-imaging based phenotyping.

Ph.D Dissertation, U. C. San Diego 2006-2011. Advisor: Dr. Joanne Chory and Dr. Steve Kay.

- Developed integrated hardware and software components for imaging and morphometric analysis of seedling phenotypes in a kinetic assay.
- Quantified transcript levels using quantitative real-time PCR and microarray analysis of RNA derived from a time course of shade-treated *Arabidopsis*.
- Developed basic plant and molecular biology skills including growing and maintaining *Arabidopsis* plants on plates and on soil, genetic crosses, transformations, cloning, DNA isolation, protein extraction and purification, western blotting, and hypocotyl growth measurements.

BS: Rensselaer Polytechnic Institute, *May, 2006*

- Major: Bioinformatics and Molecular Biology, 2006.
- Graduated Summa Cum Laude; Overall GPA: 3.92/4.0

Research and Professional Experience

Research Scientist, DOE-Joint Genome Institute (2020-Present). Supervisor: Dr. Axel Visel.

- Received an ECRP award to build single-cell atlases for sorghum and switchgrass undergoing nutrient limitation and drought.
- Led a project (funded by an LDRD with Henrik Scheller) to dissect the molecular events during colonization by Arbuscular Mycorrhizal Fungi on Medicago roots with spatial, single-cell resolution.
- Collaborated with Gitta Coaker (UC Davis) on a project to explore plant/pathogen interactions at single-cell resolution.
- Collaborated with John Vogel and Elizabeth Purdom to analyze 3 years of EPICON RNA-seq data.

Project Scientist, DOE-Joint Genome Institute (2016-2020). Supervisor: Dr. Axel Visel.

- Collaborated with Philip Benfey's group (Duke University) to build a comprehensive single-cell root transcriptome atlas.
- Led data analysis effort, in collaboration with Diane Dickel (LBNL) and Siobhan Brady (UC Davis), to

- characterize cell-type specific gene expression in plant roots using single-cell transcriptome profiling.
- Participated in a collaborative study with researchers from UC Berkeley, USDA-PGEC, and PNNL to understand the molecular basis of drought in field-planted *Sorghum bicolor*. Coordinated efforts from several groups, and participated in sampling, DNA/RNA and chromatin extraction, and initial analysis of RNA-seq data.

Synergistic Activities

Awards:

- ECRP Award (2021; Defining the influence of environmental stress on bioenergy feedstocks at single-cell resolution)
- LDRD Award (2020; Spatial Transcriptomics of the Plant/Microbial Interface)
- NSF IGERT Fellowship – Plant Systems Biology, 2007-2011.
- NSF Plant Research Program – Boyce Thompson Institute, Ithaca, NY 2005.

Selected Publications

- Zhu J, Lolle S, Tang A, Guel B, Kvitko B, Cole B, et al. Single-cell profiling of Arabidopsis leaves to *Pseudomonas syringae* infection. *Cell Rep.* 2023 Jul 25;42(7):112676.
- Fahlgren N, Kapoor M, Yordanova G, Papatheodorou I, Waese J, Cole B, et al. Toward a data infrastructure for the Plant Cell Atlas. *Plant Physiol.* 2023 Jan 2;191(1):35–46.
- Shahan R, Hsu C-W, Nolan TM, Cole BJ, Taylor IW, Greenstreet L, et al. A single-cell Arabidopsis root atlas reveals developmental trajectories in wild-type and cell identity mutants. *Dev Cell.* 2022 Feb 28;57(4):543-560.e9.
- Cole B, Bergmann D, Blaby-Haas CE, Blaby IK, Bouchard KE, Brady SM, et al. Plant single-cell solutions for energy and the environment. *Commun Biol.* 2021 Aug 12;4(1):962.
- Cole BJ, Tringe SG. Different threats, same response. *Nat Plants.* 2021 May;7(5):544–5.
- MacKinnon KJ-M, Cole BJ, Yu C, Coomey JH, Hartwick NT, Remigereau M-S, et al. Changes in ambient temperature are the prevailing cue in determining *Brachypodium distachyon* diurnal gene regulation. *New Phytol.* 2020 Sep;227(6):1709–24.
- Cole BJ, Basso JTR, Visel A. Power in isolation: insights from single cells. *Nat Rev Microbiol.* 2020 Jul;18(7):364.
- Varoquaux N, Cole B, Gao C, Pierroz G, Baker CR, Patel D, et al. Transcriptomic analysis of field-droughted sorghum from seedling to maturity reveals biotic and metabolic responses. *Proc Natl Acad Sci U S A* [Internet]. 2019 Dec 5; Available from: <http://dx.doi.org/10.1073/pnas.1907500116>
- Shulze CN, Cole BJ, Ciobanu D, Lin J, Yoshinaga Y, Gouran M, et al. High-Throughput Single-Cell Transcriptome Profiling of Plant Cell Types. *Cell Rep.* 2019 May 14;27(7):2241-2247.e4.
- Sasse J, Kant J, Cole BJ, Klein AP, Arsova B, Schlaepfer P, et al. Multilab EcoFAB study shows highly reproducible physiology and depletion of soil metabolites by a model grass. *New Phytol.* 2019 Apr;222(2):1149–60.
- Cole BJ, Feltcher ME, Waters RJ, Wetmore KM, Mucyn TS, Ryan EM, et al. Genome-wide identification of bacterial plant colonization genes. *PLoS Biol.* 2017 Sep;15(9):e2002860.
- Matos DA, Cole BJ, Whitney IP, MacKinnon KJ-M, Kay SA, Hazen SP. Daily changes in temperature, not the circadian clock, regulate growth rate in *Brachypodium distachyon*. *PLoS One.* 2014 Jun 13;9(6):e100072.
- Cole B, Kay SA, Chory J. Automated analysis of hypocotyl growth dynamics during shade avoidance in *Arabidopsis*. *Plant J.* 2011 Mar;65(6):991–1000.

Cole BJ, Bystroff C. Alpha helical crossovers favor right-handed supersecondary structures by kinetic trapping: the phone cord effect in protein folding. *Protein Sci.* 2009 Aug;18(8):1602–8.