KASEY MARKEL
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Profile

Plant synthetic biologist with 10 years of experience in molecular biology research. Passionate about improving global food security through agricultural biotechnology.

Education

University of California, Berkeley, CA — July 2021 - July 2024
- PhD in Plant Biology advised by Patrick Shih

University of California, Davis, CA — September 2018 - June 2021
- MS in Plant Biology advised by Patrick Shih

University of Cambridge, Darwin College, Cambridge, UK — November 2018
- MPhil in Plant Sciences advised by Jim Haseloff

University of Miami, College of Arts and Sciences, Coral Gables, FL — May 2017
- BS in Science! (Independent major) advised by Jeff Prince
- Minors in Biology, Chemistry, Mathematics, and Biochemistry

Standardized Examination Scores

- Passed Fundamentals of Engineering in Chemical Engineering — 2017
- 920 / 990 Graduate Records Exam Biology (99th percentile) — 2016
- 338 / 340 Graduate Records Exam (99th percentile) — 2016
  - 170 / 170 Verbal Reasoning
  - 168 / 170 Quantitative Reasoning
  - 5.5 / 6 Analytical Writing
- 36 / 36 American College Testing (99.95th percentile) — 2012

Core Skills

- Scientific writing
- Type IIS cloning
- Data analysis using R and Python
- Bacterial transformation
- Confocal microscopy
- Electron microscopy (SEM & TEM)
- ImageJ / Fiji
- Biolistic transformation
- *Agrobacterium*-mediated plant transformation

Industry roles

- **Gene editing lead** — September 2024 - present
  Semilla Nueva, Guatemala city, Guatemala
  Directing and expanding Semilla Nueva's gene editing program and orchestrating our search for better candidate genes for the next round of experiments. Performing generalist tasks such as internal cost-benefit analyses and grant writing.
- **Gene editing consultant** — October 2022 - August 2024
  Semilla Nueva, Guatemala city, Guatemala
  As gene editing lead, I have helped launch Semilla Nueva's maize gene editing program by identifying gene targets and facilitating collaborations with contract research organizations to perform the required transformations. While I don't work directly at the bench, my experience with laboratory biotechnology techniques including using CRISPR in plants has proven essential

for understanding the needs of our collaborators and coordinating between stakeholders.

- **Gene editing workshop instructor** Winter 2024
  Innovative Genomics Institute, Berkeley, California
  As a workshop instructor, I taught laboratory techniques to regulatory officials from 5 continents and over 20 countries, many of whom had little to no previous experience at the bench. In addition to teaching basic biotechnology skills, we taught some techniques specific to gene editing with CRISPR/Cas9 systems, and facilitated conversations about regulatory policy surrounding the use of gene editing in agriculture around the world.

Academic roles

- **Graduate Student Researcher** July 2021 - present
  Plant Biosystems Design Laboratory, Joint BioEnergy Institute, Emeryville, CA
  Plant synthetic biology tool development.
- **Graduate Student Researcher** April 2019 - June 2021
  Patrick Shih Laboratory, University of California, Davis, CA
  Plant synthetic biology and metabolic engineering.
- **Graduate Student Researcher** October 2017 - September 2018
  Jim Haseloff Laboratory, University of Cambridge, Cambridge, UK
  Project entailed improvement of biotechnological tools for plastid transformation in the nonvascular plant *Marchantia polymorpha*.
- **Strain Creation Technician** August - November 2016
  Antoine Van Oijen Laboratory, University of Wollongong, Australia
  Project entailed creation of bacterial strains missing components of DNA repair, which were then analyzed with single-molecule microscopy to understand repair pathways.
- **Rainforest Canopy Access Technician**
  Institute for Tropical Ecology and Education, Bocas Del Toro, Panamá June - July 2016
  Provided access and ensured safety to ecologists during fieldwork in the rainforest canopy.
- **Transmission Electron Microscopy Technician** August - December 2015
  Miami Project to Cure Paralysis
  Performed electron microscopy for any laboratory in the research program that required it. Tissues examined included brain, spinal cord, and muscular tissue from mice and rats.
- **Electron Microscopy Researcher** August 2014 - May 2017
  Jeff Prince Laboratory, University of Miami, Coral Gables, FL
  Performed scanning and transmission electron microscopy in collaboration with several labs working in human brain cancer, plant floral development, and ctenophore physiology.
- **Research Assistant** August 2013 - May 2014
  Sylvia Daunert Laboratory, Miller School of Medicine, Miami, FL
  Performed cloning, bacterial transformation, and protein purification for nutrient assays.

Awards

- Corteva Frontier of Agriculture Scholar 2022
- Graduate Student Association Conference Travel Award 2019
- University of Miami Plus One Scholarship 2016
- University of Miami Provost's Honor Roll 2014 - 2016
- Isaac Bashevis Singer Scholarship 2013
- University of Miami Foote Fellowship 2013

Leadership

- Plant Biology Graduate Group Fundraising Officer 2020-2021
- Biotechnology Program Graduate Student Representative 2019-2021
- Plant Science Departmental Graduate Student Safety Officer 2017-2018
- President of University, Miami Rock Climbing Club 2015 - 2016
- Public Relations Coordinator, University of Miami Rock Climbing Club 2014 - 2015
- Activities Coordinator, University of Miami Microbiology Club 2014 - 2015
- Adventure Coordinator, Special Interest Housing 2014 - 2015
- Member of Blue Knights & Troopers World Class Drum and Bugle Corps 2013 & 2015
- Principal Percussionist, Fossil Ridge Wind Ensemble 2012-2013
- Section Leader, Fossil Ridge Front Ensemble 2011-2012

Teaching

- Secret Life of Plants Teaching Assistant, Berkeley, CA Spring 2023
- Synthetic Biology Lab Teaching Assistant, Davis, CA Spring 2021
- Ecology and Evolution Laboratory Teaching Assistant, Davis, CA Spring 2019
- Cellular and Developmental Biology Laboratory Demonstrator, Cambridge, UK Spring 2018
- Private STEM and standardized exam Tutor Fall 2016 - Summer 2021
- Introductory Biology Workshop Leader, Miami, FL Spring 2014, 2017
- Transmission Electron Microscopy Teaching Assistant, Miami, FL Autumn 2016

Publications

- **Markel, Kasey,** Sabety, Jean, Wijesinghe, Shehan, Shih, Patrick. "Design and Characterization of a Transcriptional Repression Toolkit for Plants." ACS Synthetic Biology 13.10 (2024): 3137-3143.
- **Markel, Kasey**, Lucas Waldburger, and Patrick M. Shih. "Expression of a mammalian RNA demethylase increases flower number and floral stem branching in Arabidopsis thaliana." *Plant Direct* 8.8 (2024): e70000.
- Barnum, Collin R., Cho, Myeong-Je, **Markel, Kasey**, Shih, Patrick. "Engineering Brassica Crops to Optimize Delivery of Bioactive Products Postcooking." *ACS Synthetic Biology* (2024).
- Hummel, Niklas, **Markel, Kasey,** Stefani, Jordan, Staller, Max V, Shih, Patrick. "Systematic identification of transcriptional activation domains from non-transcription factor proteins in plants and yeast." *Cell Systems* (2024)
- **Markel, Kasey**, et al. "Cynipid wasps systematically reprogram host metabolism and restructure cell walls in developing galls." *Plant Physiology* 195.1 (2024): 698-712.
- Hummel, Niklas FC, Zhou, Andy, Li, Baohua, **Markel, Kasey**, Ornelas, Izaiah, Shih, Patrick. "The trans-regulatory landscape of gene networks in plants." Cell Systems 14.6 (2023)
- Sirirungruang, Sasilada, **Kasey Markel**, and Patrick M. Shih. "Plant-based engineering for production of high-valued natural products." Natural Product Reports 39.7 (2022): 1492-1509.
- **Markel, Kasey,** and Patrick M. Shih. "From breeding to genome design: A genomic makeover for potatoes." *Cell* 184.15 (2021): 3843-3845.
- Pan, Changtian, Wu, Xincheng, **Markel, Kasey...** Shih, Patrick, Qi, Yiping. "CRISPR–Act3. 0 for highly efficient multiplexed gene activation in plants." *Nature Plants* 7.7 (2021): 942-953.
- Frangedakis, Eftychios, Guzman-Chavez, Fernando, Rebmann, Marius, **Markel, Kasey...**

Haseloff, Jim "Construction of DNA Tools for Hyperexpression in Marchantia Chloroplasts." ACS Synthetic Biology (2021).

- Frangedakis, Eftychios, **Markel, Kasey,** Suaret-Gueto, Susana, Haseloff, Jim "Rapid and Modular DNA Assembly for Transformation of Marchantia Chloroplasts." Chloroplast Biotechnology. Humana, New York, NY, 2021. 343-365.
- Yang, Xiaohan, Medford, June, **Markel, Kasey**... Tuskan, Gerald "Plant biosystems design research roadmap 1.0." BioDesign Research 2020 (2020).
- **Markel, Kasey,** Belcher, Michael, and Shih, Patrick “Defining and engineering bioenergy crop ideotypes.” Current Opinion in Biotechnology 2020
- Guoliang Yuan, Md. Mahmudul Hassan, Degao Liu, Sung Don Lim, Won Cheol Yim, John C. Cushman, **Kasey Markel**, Patrick M. Shih, Haiwei Lu, David J. Weston, Jin-Gui Chen, Timothy J. Tschaplinski, Gerald A. Tuskan, Xiaohan Yang, "Biosystems Design to Accelerate C3-to-CAM Progression", BioDesign Research, 2020.
- Frangedakis, Eftychios, **Markel, Kasey**, Sauret-Gueto, Susana and Haseloff, Susana “Systematic tools for reprogramming plant gene expression in a simple model, *Marchantia polymorpha*.” ACS Synthetic Biology, 2020.
- **Markel, Kasey** “Lack of evidence for associative learning in pea plants”, eLife, 2020
- **Markel, Kasey** “Prospective and retrospective rigour: scientific evaluation of environmental policy.” Cambridge University Science and Policy Exchange (2018) Web.
- Rebelo, Adriana P.,Abrams, Alexander J., Cottenie, Ellen, Horga, Alexandro, Gonzalez, Michael, Bis, Dana M., Sanchez-Mejias, Avencia, Pinto, Milen, Buglo, Elena, **Markel, Kasey**... Zuchner, Stephen. "Cryptic Amyloidogenic Elements in the 3′ UTRs of Neurofilament Genes Trigger Axonal Neuropathy." *The American Journal of Human Genetics* 98.4 (2016): 597-614.
- **Markel, Kasey**. "Miniature Marvels." *University of Miami Scientifica* 02.1 (2016): 17-18. Web.