Stanford

Jenn Brophy

Assistant Professor of Bioengineering

Bio

BIO

Jenn is an Assistant Professor of Bioengineering. Her lab develops technologies that enable the genetic engineering of plants and their associated microbes to uncover mechanisms of environmental stress resilience and to drive innovation in agriculture for a sustainable future. She received her B.S. in Bioengineering from UC Berkeley in 2009 and PhD in Biological Engineering from MIT in 2016. During her PhD, developed tools for engineering non-model bacteria. She got into plants as a postdoc, where she worked with José Dinneny at Stanford to engineer spatial patterns of gene expression across plant tissues using synthetic genetic circuits.

ACADEMIC APPOINTMENTS

- Assistant Professor, Bioengineering
- Member, Bio-X

HONORS AND AWARDS

- Freeman Hrabowski Scholar, Howard Hughes Medical Institute (2026 - present)
- CAREER Award, U.S. National Science Foundation (2023 - 2028)
- Early Career Award, U.S. Department of Energy (2023 - 2028)
- Chan-Zuckerberg Biohub Investigator, Chan-Zuckerberg Biohub - San Francisco (2021 - 2026)
- Robert N. Noyce Family Faculty Fellow, Stanford University (2021 - 2024)
- Career Award at the Scientific Interface, Burroughs Wellcome Fund (2018 - 2022)
- Graduate Women of Excellence Award, Massachusetts Institute of Technology (2015)
- Graduate Fellowship, U.S. National Science Foundation (2011 - 2014)
- Graduate Fellowship, MIT Energy Initiative (2010 - 2011)
- Gold Medal, International Genetically Engineered Machine (iGEM) Competition (2009)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Editorial Advisory Board Member, ACS Synthetic Biology (2021 - present)
- Editorial Advisory Board Member, New Phytologist (2026 - present)
- Editorial Advisory Board Member, Journal of Biological Chemistry (2026 - present)
- Co-Chair, Synthetic Biology Committee, Plant Cell Atlas (2021 - present)
- Council Member, Engineering Biology Research Consortium (2022 - present)

PROFESSIONAL EDUCATION

- Postdoctoral Fellow, Stanford University , Biology (2021)
- Ph.D., Massachusetts Institute of Technology , Biological Engineering (2016)
- B.S., University of California at Berkeley , Bioengineering (2010)

LINKS

- Brophy lab site: http://www.brophylab.org/

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Our lab develops technologies that enable the genetic engineering of plants and their associated microbes. We use these tools to study mechanisms of plant development and environmental stress resilience.

Much of our research focuses on the development and use of synthetic genetic circuits, which are powerful tools for reprogramming the behavior of living organisms. We use genetic circuits to create specific spatiotemporal patterns of gene expression in plants, which allows us to modify plant size and shape and use the resulting plants to study questions like environmental stress tolerance. A better understanding of the plant features that are important for environmental stress tolerance would enable targeted breeding and biotechnological interventions that strengthen our agricultural systems.

Teaching

COURSES

2025-26

- Fundamentals for Engineering Biology Lab: BIOE 44 (Spr)
- Plant Bioengineering: BIOE 246 (Aut)
- Synthetic proteins and genetic circuits: BIO 246, BIOE 266, GENE 246 (Aut)

2024-25

- Fundamentals for Engineering Biology Lab: BIOE 44 (Win)
- Introduction to Bioengineering (Engineering Living Matter): BIOE 80, ENGR 80 (Spr)
- Synthetic proteins and genetic circuits: BIO 246, BIOE 266, GENE 246 (Aut)

2023-24

- Fundamentals for Engineering Biology Lab: BIOE 44 (Win)
- Introduction to Bioengineering (Engineering Living Matter): BIOE 80, ENGR 80 (Spr)

2022-23

- Fundamentals for Engineering Biology Lab: BIOE 44 (Win)
- Introduction to Bioengineering (Engineering Living Matter): BIOE 80, ENGR 80 (Spr)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Ravalika Damerla, Irene Martinez, Rachel Porter, Carin Ragland

Postdoctoral Faculty Sponsor

Alex Borowsky, Soyeon Choi, Gabriel Ferreras Garrucho, Cuyler Luck

Doctoral Dissertation Advisor (AC)

Bella Archibald, Vin Armelin, Alice Gevorgyan, Isabel Goldaracena Aguirre, Anna Johnson, Carlie McGrath, Sarah Weber, Vivian Zhong

Doctoral (Program)

Sasha Bronovitskiy, Danielle Klinger, Franklin Lurie, Kevin Ly, Benjamin Rosenbluth

Publications

PUBLICATIONS

- **Genetic code expansion enables plant-directed control of bacterial activity** *BioRxiv*
  Zhong, V., Jones, M. A., Cabales, A., Gevorgyan, A., Inckemann, R., Johnson, A. A., Karunadasa, S. S., Forti, A. M., Xu, S., Kunjapur, A. M., Brophy, J. A.
  2026
- **Getting to the root of the pattern.** *Science (New York, N.Y.)*
  Kozaeva, E., Brophy, J. A.
  2025; 390 (6768): 24-25
- **Focus Issue Editorial: Numeracy, Realism and Relevance in Plant Science.** *Plant physiology*
  Brophy, J. A., Lin, Y. R., Shanks, J. V., Smith, A. G., Williams, M., Hanson, A. D.
  2025
- **SeedSeg: image-based transgenic seed counting for segregation analysis of T-DNA loci.** *Plant methods*
  Hernández, S., Zhong, V., Brophy, J. A.
  2025; 21 (1): 87
- **Roots of synthetic ecology: microbes that foster plant resilience in the changing climate.** *Current opinion in biotechnology*
  Kozaeva, E., Eida, A. A., Gunady, E. F., Dangl, J. L., Conway, J. M., Brophy, J. A.
  2024; 88: 103172
- **Policy makers, genetic engineers, and an engaged public can work together to create climate-resilient plants.** *PLoS biology*
  Archibald, B. N., Zhong, V., Brophy, J. A.
  2023; 21 (7): e3002208
- **Forging a path toward a more sustainable laboratory.** *Trends in biochemical sciences*
  Leak, L. B., Tamborski, J., Commissaris, A., Brophy, J. A.
  2023; 48 (1): 5-8
- **Transcriptional and post-transcriptional controls for tuning gene expression in plants.** *Current opinion in plant biology*
  Zhong, V., Archibald, B. N., Brophy, J. A.
  2022; 71: 102315
- **Synthetic genetic circuits as a means of reprogramming plant roots.** *Science (New York, N.Y.)*
  Brophy, J. A., Magallon, K. J., Duan, L., Zhong, V., Ramachandran, P., Kniazev, K., Dinneny, J. R.
  2022; 377 (6607): 747-751
- **First Plant Cell Atlas symposium report** *PLANT DIRECT*
  Rice, S. L., Lazarus, E., Anderton, C., Birnbaum, K., Brophy, J., Cole, B., Dickel, D., Ehrhardt, D., Fahlgren, N., Frank, M., Haswell, E., Huang, S., Leiboff, et al
  2022; 6 (6)
- **Toward synthetic plant development.** *Plant physiology*
  Brophy, J. A.
  1800
- **Intrinsically disordered protein biosensor tracks the physical-chemical effects of osmotic stress on cells.** *Nature communications*
  Cuevas-Velazquez, C. L., Vellosillo, T., Guadalupe, K., Schmidt, H. B., Yu, F., Moses, D., Brophy, J. A., Cosio-Acosta, D., Das, A., Wang, L., Jones, A. M., Covarrubias, A. A., Sukenik, et al

2021; 12 (1): 5438

- **Vision, challenges and opportunities for a Plant Cell Atlas.** *eLife*
  Plant Cell Atlas Consortium, Jha, S. G., Borowsky, A. T., Cole, B. J., Fahlgren, N., Farmer, A., Huang, S. C., Karia, P., Libault, M., Provart, N. J., Rice, S. L., Saura-Sanchez, M., Agarwal, P., et al
  2021; 10

- **Understanding and engineering plant form** *SEMINARS IN CELL & DEVELOPMENTAL BIOLOGY*
  Brophy, J. A. N., LaRue, T., Dinneny, J. R.
  2018; 79: 68–77