



José R. Dinneny

Professor of Biology

 Curriculum Vitae available Online

Bio

BIO

José Dinneny earned his BS in Plant Biology and Genetics from UC Berkeley. He pursued his Ph.D. at UC San Diego, under Detlef Weigel at the Salk Institute for Biological Studies and Martin Yanofsky in the Division of Biology, focusing on molecular genetic processes governing plant organ shape. As a post-doc, he joined the lab of Philip Benfey at Duke University, pioneering the use of Fluorescence Activated Cell Sorting (FACS) to create the first tissue-specific map of transcriptional changes during abiotic stress. José established his independent lab at the Temasek Lifesciences Laboratory (TLL) in Singapore, concurrently affiliated with the National University of Singapore's Department of Biological Sciences. In 2011, he moved his lab to the Carnegie Institution for Science, Department of Plant Biology, and in 2018, he joined Stanford University as a Professor in the Biology Department.

Over 15 years, Dinneny's research has revealed novel plant adaptations to water-related stresses, with broad physiological and agricultural implications. He unraveled developmental and molecular mechanisms, introduced innovative imaging and robotics approaches for plant-environment studies, and pioneered synthetic biology tools for precise plant engineering.

José's accolades include Chan Zuckerberg Biohub Investigator, AAAS Fellow, HHMI-Simons Faculty Scholar, National Research Foundation of Singapore fellow, NIH Ruth Kirschstein post-doctoral fellow, and HHMI predoctoral fellow. He was featured in Science News magazine's "2017 SN 10: Scientists to Watch" list and honored in 2023 with the Charles Albert Shull award by the American Society of Plant Biologists.

ACADEMIC APPOINTMENTS

- Professor, Biology
- Member, Bio-X

ADMINISTRATIVE APPOINTMENTS

- Director of Graduate Studies, Department of Biology, (2019-2022)

HONORS AND AWARDS

- Charles Albert Shull Award, American Society of Plant Biologists (2023)
- AAAS Fellow, American Association for the Advancement of Science (2022)
- Chan Zuckerberg Biohub Investigator Award, Chan Zuckerberg Biohub (2022)
- Stanford Biosciences Excellence in Mentoring and Service Award, Stanford University (2021)
- Leading Interdisciplinary Collaborations (LInC) Fellow, Stanford Woods Institute for the Environment (2018)
- SN10: Scientists to Watch, Science News Magazine (2017)

- Faculty Scholar Award, HHMI and Simons Foundation (2016)
- National Research Foundation Fellowship, Singapore Government (2008)
- Ruth L. Kirschstein National Research Service Award, National Institutes of Health (2005)
- Predoctoral Graduate Fellowship, HHMI (2000)
- Babcock Prize, College of Natural Resources, UC Berkeley (2000)

PROFESSIONAL EDUCATION

- Post-doc, Duke University , Plant Systems Biology (2008)
- PhD, University of California, San Diego , Biology (2005)
- BS, University of California, Berkeley , Plant Biology and Genetics (2000)

LINKS

- Dinneny lab website: <https://dinnenylab.me/>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

In the next 50 years, one of the greatest advances we can make for global human health is the realization of a society that is fully sustainable. My research aims to improve agricultural sustainability by using a holistic approach that integrates across genetic, cellular and organismal scales to understand how plants survive stressful environments (Dinneny, 2015a; 2019). Prior research has explored water-stress responses at unparalleled spatial and temporal resolution, and identified the endodermal tissue layer as a critical signaling center for controlling growth and tissue differentiation in roots (Duan et al., 2013; Geng et al., 2013; Dinneny et al., 2008). The discovery of novel adaptive mechanisms used by roots to capture water established potential targets for breeding to improve water use efficiency (Bao et al., 2014; Sebastian et al., 2016). The invention of imaging methods enabled multidimensional studies of plant acclimation and illuminated our understanding of organ system growth from germination to senescence (Rellán-Álvarez et al., 2015; Sebastian et al., 2016). Physiological and molecular insight has been gained in understanding how plants sense water availability through computational modeling of tissue hydraulics (Robbins and Dinneny, 2015, 2018). Additionally, fine-scale biomechanical measurements identified a novel mechanism by which salinity damages cells through its effects on cell-wall integrity (Feng et al., 2018). I have paired my research with a personal passion for improving the education of young plant scientists, engaging lawmakers through science policy, and by being a vocal advocate for the broad deployment of agricultural biotechnology (Fahlgren et al., 2016, Friesner et al., 2021).

Teaching

COURSES

2023-24

- Physiology: BIO 84 (Win)

2022-23

- Biology PhD Lab Rotation: BIO 299 (Aut)
- Cell and Developmental Biology of Plants: BIO 155, BIO 255 (Aut)
- Physiology: BIO 84 (Win)

2021-22

- Biology PhD Lab Rotation: BIO 299 (Aut)
- Managing Your PhD: BIO 305 (Aut, Spr)
- Physiology: BIO 84 (Win)

2020-21

- Biology PhD Lab Rotation: BIO 299 (Aut, Win, Spr, Sum)
- Cell and Developmental Biology of Plants: BIO 155, BIO 255 (Aut)
- Managing Your PhD: BIO 305 (Aut, Win, Spr)
- Physiology: BIO 84 (Win)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Hannah Fung, Macy Vollbrecht

Postdoctoral Faculty Sponsor

Christopher Dundas, Heather Phillips, Prashanth Ramachandran, Hector Torres Martinez, Guannan Wang

Doctoral Dissertation Advisor (AC)

Willian Goudinho Viana, Carin Ragland, Andrea Ramirez, Kevin Shih, Sebastian Toro Arana

Undergraduate Major Advisor

Alyana Diaz McNeal

Doctoral (Program)

Willian Goudinho Viana, Carin Ragland, Andrea Ramirez

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Biology (School of Humanities and Sciences) (Phd Program)

Publications

PUBLICATIONS

- **PlantACT! - how to tackle the climate crisis.** *Trends in plant science*
Hirt, H., Al-Babili, S., Almeida-Trapp, M., Martin, A., Aranda, M., Bartels, D., Bennett, M., Blilou, I., Boer, D., Boulouis, A., Bowler, C., Brunel-Muguet, S., Chardon, et al
2023; 28 (5): 537-543
- **Uncovering natural variation in root system architecture and growth dynamics using a robotics-assisted phenomics platform.** *eLife*
LaRue, T., Lindner, H., Srinivas, A., Exposito-Alonso, M., Lobet, G., Dinneny, J. R.
2022; 11
- **Genetic Circuit Design in Rhizobacteria.** *Biodesign research*
Dundas, C. M., Dinneny, J. R.
2022; 2022: 9858049
- **Burning questions for a warming and changing world: 15 unknowns in plant abiotic stress.** *The Plant cell*
Verslues, P. E., Bailey-Serres, J., Brodersen, C., Buckley, T. N., Conti, L., Christmann, A., Dinneny, J. R., Grill, E., Hayes, S., Heckman, R. W., Hsu, P., Juenger, T. E., Mas, et al
2022
- **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
- **Systematic characterization of gene function in the photosynthetic alga *Chlamydomonas reinhardtii*.** *Nature genetics*
Fauser, F., Vilarrasa-Blasi, J., Onishi, M., Ramundo, S., Patena, W., Millican, M., Osaki, J., Philp, C., Nemeth, M., Salome, P. A., Li, X., Wakao, S., Kim, et al
2022

- **Divergence in the ABA gene regulatory network underlies differential growth control.** *Nature plants*
Sun, Y., Oh, D., Duan, L., Ramachandran, P., Ramirez, A., Bartlett, A., Tran, K., Wang, G., Dassanayake, M., Dinneny, J. R.
2022
- **A Thermoacoustic Imaging System for Noninvasive and Nondestructive Root Phenotyping** *IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS II-EXPRESS BRIEFS*
Singhvi, A., Fitzpatrick, A., Scharwies, J., Dinneny, J. R., Arbabian, A.
2022; 69 (5): 2493-2497
- **Deconstructing the root system of grasses through an exploration of development, anatomy, and function.** *Plant, cell & environment*
Viana, W. G., Scharwies, J. D., Dinneny, J. R.
1800
- **Intrinsically disordered protein biosensor tracks the physical-chemical effects of osmotic stress on cells.** *Nature communications*
Cuevas-Velazquez, C. L., Velloso, 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
- **A plant lipocalin promotes retinal-mediated oscillatory lateral root initiation.** *Science (New York, N.Y.)*
Dickinson, A. J., Zhang, J., Luciano, M., Wachsman, G., Sandoval, E., Schnermann, M., Dinneny, J. R., Benfey, P. N.
2021
- **TRANVIA (TVA) facilitates cellulose synthase trafficking and delivery to the plasma membrane.** *Proceedings of the National Academy of Sciences of the United States of America*
Velloso, T., Dinneny, J. R., Somerville, C. R., Ehrhardt, D. W.
2021; 118 (30)
- **Broadening the impact of plant science through innovative, integrative, and inclusive outreach.** *Plant direct*
Friesner, J., Colon-Carmona, A., Schnoes, A. M., Stepanova, A., Mason, G. A., Macintosh, G. C., Ullah, H., Baxter, I., Callis, J., Sierra-Cajas, K., Elliott, K., Haswell, E. S., Zavala, et al
2021; 5 (4): e00316
- **Characterization of CYCLOPHILLIN38 shows that a photosynthesis-derived systemic signal controls lateral root emergence.** *Plant physiology*
Duan, L. n., Pérez-Ruiz, J. M., Cejudo, F. J., Dinneny, J. R.
2021; 185 (2): 503–18
- **Mechanobiology: Plant Cells Face Pressure from Neighbors.** *Current biology : CB*
Dinneny, J. R.
2020; 30 (8): R344–R346
- **A Wall with Integrity: Surveillance and Maintenance of the Plant Cell Wall Under Stress.** *The New phytologist*
Rui, Y., Dinneny, J. R.
2019
- **Cytokinin functions as an asymmetric and anti-gravitropic signal in lateral roots.** *Nature communications*
Waidmann, S., Ruiz Rosquete, M., Scholler, M., Sarkel, E., Lindner, H., LaRue, T., Petrik, I., Dunser, K., Martopawiro, S., Sasidharan, R., Novak, O., Wabnik, K., Dinneny, et al
2019; 10 (1): 3540
- **Developmental Responses to Water and Salinity in Root Systems.** *Annual review of cell and developmental biology*
Dinneny, J. R.
2019
- **EcoFABs: advancing microbiome science through standardized fabricated ecosystems.** *Nature methods*
Zengler, K., Hofmockel, K., Baliga, N. S., Behie, S. W., Bernstein, H. C., Brown, J. B., Dinneny, J. R., Floge, S. A., Forry, S. P., Hess, M., Jackson, S. A., Jansson, C., Lindemann, et al
2019
- **beta-Cyclocitral is a conserved root growth regulator** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Dickinson, A. J., Lehner, K., Mi, J., Jia, K., Mijar, M., Dinneny, J., Al-Babili, S., Benfey, P. N.

2019; 116 (21): 10563–67

- **Environmental Stress: Salinity Ruins a Plant's Day in the Sun.** *Current biology : CB*
Magallon, K. J., Dinneny, J. R.
2019; 29 (10): R360–R362
- **Water transport, perception, and response in plants** *JOURNAL OF PLANT RESEARCH*
Scharwies, J., Dinneny, J. R.
2019; 132 (3): 311–24
- **Directions for research and training in plant omics: Big Questions and Big Data.** *Plant direct*
Argueso, C. T., Assmann, S. M., Birnbaum, K. D., Chen, S., Dinneny, J. R., Doherty, C. J., Eveland, A. L., Friesner, J., Greenlee, V. R., Law, J. A., Marshall-Colon, A., Mason, G. A., O'Leary, et al
2019; 3 (4): e00133
- **Non-Contact Thermoacoustic Sensing and Characterization of Plant Root Traits**
Singhvi, A., Ma, B., Scharwies, J., Dinneny, J. R., Khuri-Yakub, B. T., Arbabian, A., IEEE
IEEE.2019: 1992–95
- **Root branching toward water involves posttranslational modification of transcription factor ARF7.** *Science (New York, N.Y.)*
Orosa-Puente, B., Leftley, N., von Wangenheim, D., Banda, J., Srivastava, A. K., Hill, K., Truskina, J., Bhosale, R., Morris, E., Srivastava, M., Kumpers, B., Goh, T., Fukaki, et al
2018; 362 (6421): 1407–10
- **Suppression of Arabidopsis GGLT1 affects growth by reducing the L-galactose content and borate cross-linking of rhamnogalacturonan-II** *PLANT JOURNAL*
Sechet, J., Htwe, S., Urbanowicz, B., Agyeman, A., Feng, W., Ishikawa, T., Colomes, M., Kumar, K., Kawai-Yamada, M., Dinneny, J. R., O'Neill, M. A., Mortimer, J. C.
2018; 96 (5): 1036–50
- **Organization out of disorder: liquid-liquid phase separation in plants** *CURRENT OPINION IN PLANT BIOLOGY*
Cuevas-Velazquez, C. L., Dinneny, J. R.
2018; 45: 68–74
- **Seeds of Science Why We Got It So Wrong on GMOs (Book Review)** *SCIENCE*
Book Review Authored by: Dinneny, J. R.
2018; 360 (6396): 1407
- **Organization out of disorder: liquid-liquid phase separation in plants.** *Current opinion in plant biology*
Cuevas-Velazquez, C. L., Dinneny, J. R.
2018; 45 (Pt A): 68–74
- **Q&A: How do gene regulatory networks control environmental responses in plants?** *BMC BIOLOGY*
Sun, Y., Dinneny, J. R.
2018; 16: 38
- **Growth is required for perception of water availability to pattern root branches in plants.** *Proceedings of the National Academy of Sciences of the United States of America*
Robbins, N. E., Dinneny, J. R.
2018
- **The 6xABRE synthetic promoter enables the spatiotemporal analysis of ABA-mediated transcriptional regulation.** *Plant physiology*
Wu, R. n., Duan, L. n., Pruneda-Paz, J. n., Oh, D. H., Pound, M. P., Kay, S. A., Dinneny, J. R.
2018
- **The FERONIA Receptor Kinase Maintains Cell-Wall Integrity during Salt Stress through Ca²⁺ Signaling.** *Current biology : CB*
Feng, W. n., Kita, D. n., Peaucelle, A. n., Cartwright, H. N., Doan, V. n., Duan, Q. n., Liu, M. C., Maman, J. n., Steinhorst, L. n., Schmitz-Thom, I. n., Yvon, R. n., Kudla, J. n., Wu, et al
2018
- **Time dependent genetic analysis links field and controlled environment phenotypes in the model C4 grass Setaria.** *PLoS genetics*

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- Feldman, M. J., Paul, R. E., Banan, D., Barrett, J. F., Sebastian, J., Yee, M. C., Jiang, H., Lipka, A. E., Brutnell, T. P., Dinneny, J. R., Leakey, A. D., Baxter, I. 2017; 13 (6): e1006841
- **A microbially derived tyrosine-sulfated peptide mimics a plant peptide hormone.** *New phytologist*
Pruitt, R. N., Joe, A., Zhang, W., Feng, W., Stewart, V., Schwessinger, B., Dinneny, J. R., Ronald, P. C. 2017
 - **Root hydrotropism is controlled via a cortex-specific growth mechanism.** *Nature plants*
Dietrich, D., Pang, L., Kobayashi, A., Fozard, J. A., Boudolf, V., Bhosale, R., Antoni, R., Nguyen, T., Hiratsuka, S., Fujii, N., Miyazawa, Y., Bae, T., Wells, et al 2017; 3: 17057-?
 - **Understanding and engineering plant form.** *Seminars in cell & developmental biology*
Brophy, J. A., LaRue, T. n., Dinneny, J. R. 2017
 - **Setaria viridis: A Model for Understanding Panicoid Grass Root Systems** *GENETICS AND GENOMICS OF SETARIA*
Sebastian, J., Dinneny, J. R., Doust, A., Diao 2017; 19: 177–93
 - **The Next Generation of Training for Arabidopsis Researchers: Bioinformatics and Quantitative Biology.** *Plant physiology*
Friesner, J. n., Assmann, S. M., Bastow, R. n., Bailey-Serres, J. n., Beynon, J. n., Brendel, V. n., Buell, C. R., Bucksch, A. n., Busch, W. n., Demura, T. n., Dinneny, J. R., Doherty, C. J., Eveland, et al 2017; 175 (4): 1499–1509
 - **Grasses suppress shoot-borne roots to conserve water during drought** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Sebastian, J., Yee, M., Viana, W. G., Rellán-Alvarez, R., Feldman, M., Priest, H. D., Trontin, C., Lee, T., Jiang, H., Baxter, I., Mockler, T. C., Hochholdinger, F., Brutnell, et al 2016; 113 (31): 8861-8866
 - **Growing Out of Stress: The Role of Cell- and Organ-Scale Growth Control in Plant Water-Stress Responses.** *Plant cell*
Feng, W., Lindner, H., Robbins, N. E., Dinneny, J. R. 2016; 28 (8): 1769-1782
 - **Environmental Control of Root System Biology** *ANNUAL REVIEW OF PLANT BIOLOGY, VOL 67*
Rellán-Alvarez, R., Lobet, G., Dinneny, J. R. 2016; 67: 619-642
 - **GLO-Roots: an imaging platform enabling multidimensional characterization of soil-grown root systems** *ELIFE*
Rellán-Alvarez, R., Lobet, G., Lindner, H., Pradier, P., Sebastian, J., Yee, M., Geng, Y., Trontin, C., LaRue, T., Schragger-Lavelle, A., Haney, C. H., Nieu, R., Maloof, et al 2015; 4
 - **Low Sugar Is Not Always Good: Impact of Specific O-Glycan Defects on Tip Growth in Arabidopsis** *PLANT PHYSIOLOGY*
Velasquez, S. M., Marzol, E., Borassi, C., Pol-Fachin, L., Ricardi, M. M., Mangano, S., Denita Juárez, S. P., Salgado Salter, J. D., Gloazzo Dorosz, J., Marcus, S. E., Knox, J. P., Dinneny, J. R., Iusem, et al 2015; 168 (3): 808-U918
 - **The diving root: moisture-driven responses of roots at the micro- and macro-scale** *JOURNAL OF EXPERIMENTAL BOTANY*
Robbins, N. E., Dinneny, J. R. 2015; 66 (8): 2145-2154
 - **Traversing organizational scales in plant salt-stress responses** *CURRENT OPINION IN PLANT BIOLOGY*
Dinneny, J. R. 2015; 23: 70-75
 - **Salt-stress regulation of root system growth and architecture in Arabidopsis seedlings.** *Methods in molecular biology (Clifton, N.J.)*
Duan, L., Sebastian, J., Dinneny, J. R. 2015; 1242: 105-122
 - **Beyond the Barrier: Communication in the Root through the Endodermis** *PLANT PHYSIOLOGY*
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- Robbins, N. E., Trontin, C., Duan, L., Dinneny, J. R.
2014; 166 (2): 551-559
- **Beyond the barrier: communication in the root through the endodermis.** *Plant physiology*
Robbins, N. E., Trontin, C., Duan, L., Dinneny, J. R.
2014; 166 (2): 551-559
 - **Plant roots use a patterning mechanism to position lateral root branches toward available water** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Bao, Y., Aggarwal, P., Robbins, N. E., Sturrock, C. J., Thompson, M. C., Tan, H. Q., Tham, C., Duan, L., Rodriguez, P. L., Vernoux, T., Mooney, S. J., Bennett, M. J., Dinneny, et al
2014; 111 (25): 9319-9324
 - **Plant roots use a patterning mechanism to position lateral root branches toward available water.** *Proceedings of the National Academy of Sciences of the United States of America*
Bao, Y., Aggarwal, P., Robbins, N. E., Sturrock, C. J., Thompson, M. C., Tan, H. Q., Tham, C., Duan, L., Rodriguez, P. L., Vernoux, T., Mooney, S. J., Bennett, M. J., Dinneny, et al
2014; 111 (25): 9319-9324
 - **Methods to Promote Germination of Dormant Setaria viridis Seeds** *PLOS ONE*
Sebastian, J., Wong, M. K., Tang, E., Dinneny, J. R.
2014; 9 (4)
 - **Circular RNA is expressed across the eukaryotic tree of life.** *PloS one*
Wang, P. L., Bao, Y., Yee, M., Barrett, S. P., Hogan, G. J., Olsen, M. N., Dinneny, J. R., Brown, P. O., Salzman, J.
2014; 9 (6)
 - **A gateway with a guard: How the endodermis regulates growth through hormone signaling** *PLANT SCIENCE*
Dinneny, J. R.
2014; 214: 14-19
 - **Circular RNA Is Expressed across the Eukaryotic Tree of Life.** *PloS one*
Wang, P. L., Bao, Y., Yee, M., Barrett, S. P., Hogan, G. J., Olsen, M. N., Dinneny, J. R., Brown, P. O., Salzman, J.
2014; 9 (3)
 - **A robust family of Golden Gate Agrobacterium vectors for plant synthetic biology** *FRONTIERS IN PLANT SCIENCE*
Emami, S., Yee, M., Dinneny, J. R.
2013; 4
 - **A Spatio-Temporal Understanding of Growth Regulation during the Salt Stress Response in Arabidopsis** *PLANT CELL*
Geng, Y., Wu, R., Wee, C. W., Xie, F., Wei, X., Chan, P. M., Tham, C., Duan, L., Dinneny, J. R.
2013; 25 (6): 2132-2154
 - **Endodermal ABA Signaling Promotes Lateral Root Quiescence during Salt Stress in Arabidopsis Seedlings** *PLANT CELL*
Duan, L., Dietrich, D., Ng, C. H., Chan, P. M., Bhalerao, R., Bennett, M. J., Dinneny, J. R.
2013; 25 (1): 324-341