

# Stanford

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## Dominique Bergmann

Professor of Biology

### Bio

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#### ACADEMIC APPOINTMENTS

- Professor, Biology
- Member, Bio-X
- Member, Stanford Cancer Institute

#### ADMINISTRATIVE APPOINTMENTS

- Associate Member, Institute for Stem Cell Biology and Regenerative Medicine, Stanford School of Medicine, (2011- present)
- Adjunct Staff Member, Carnegie Institution for Science, Dept. of Plant Biology, (2011- present)

#### PROFESSIONAL EDUCATION

- PhD, University of Colorado, Boulder , Molecular Biology (2000)
- Postdoctoral, Carnegie Institution , Plant Development

#### LINKS

- Bergmann Lab: <http://www.stanford.edu/group/bergmann/cgi-bin/bergmannlab/>

### Research & Scholarship

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#### CURRENT RESEARCH AND SCHOLARLY INTERESTS

Generating the full complement of functional cell types requires coordinating the production of cells with the specification programs that distinguish one cell type from another. Asymmetric cell division, in which one cell divides to create daughter cells that differ in size, location, cellular components or fate, is extensively used in the development of animals. In development of the epidermis in the model plant *Arabidopsis thaliana*, the specification and distribution of stomatal guard cells also requires oriented cell divisions. By studying stomatal development, one can explore how cells choose to initiate asymmetric divisions, how cells establish an internal polarity that can be translated into an asymmetric cell division, and how cells interpret external cues to align their divisions relative to the polarity of the whole tissue. Moreover, approaching these questions in a plant system is likely to reveal new solutions to the problem of balancing the robust specification of cell types with the ability to change development in the face of injury or environmental change.

### Teaching

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#### COURSES

2017-18

- Genetics: BIO 82 (Aut)

#### 2016-17

- Genetics, Biochemistry, and Molecular Biology: BIO 41 (Aut)

#### 2015-16

- Genetics, Biochemistry, and Molecular Biology: BIO 41 (Aut)

#### 2014-15

- Genetics, Biochemistry, and Molecular Biology: BIO 41 (Aut)

### STANFORD ADVISEES

#### Postdoctoral Faculty Sponsor

Camila Lopez-Anido, Andrea Mair, Michael Raissig, Annika Weimer

#### Doctoral (Program)

Yang Bi, Therese LaRue, Abigail Simmons

#### Doctoral Dissertation Reader (AC)

Jae Chung, Paola Moreno-Roman, Miranda Stratton

#### Doctoral Dissertation Co-Advisor (AC)

Yang Bi, Therese LaRue

#### Doctoral Dissertation Advisor (AC)

Abigail Simmons

### GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

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

### Publications

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#### PUBLICATIONS

- **Tissue-wide Mechanical Forces Influence the Polarity of Stomatal Stem Cells in Arabidopsis** *CURRENT BIOLOGY*  
Bringmann, M., Bergmann, D. C.  
2017; 27 (6): 877-883
- **Mobile MUTE specifies subsidiary cells to build physiologically improved grass stomata** *SCIENCE*  
Raissig, M. T., Matos, J. L., Gil, M. X., Kornfeld, A., Bettadapur, A., Abrash, E., Allison, H. R., Badgley, G., Vogel, J. P., Berry, J. A., Bergmann, D. C.  
2017; 355 (6330): 1215-1218
- **Origin and function of stomata in the moss Physcomitrella patens.** *Nature plants*  
Chater, C. C., Caine, R. S., Tomek, M., Wallace, S., Kamisugi, Y., Cuming, A. C., Lang, D., MacAlister, C. A., Casson, S., Bergmann, D. C., Decker, E. L., Frank, W., Gray, et al  
2016; 2: 16179-?
- **Fine-scale dissection of the subdomains of polarity protein BASL in stomatal asymmetric cell division.** *Journal of experimental botany*  
Zhang, Y., Bergmann, D. C., Dong, J.  
2016; 67 (17): 5093-5103
- **Modulators of Stomatal Lineage Signal Transduction Alter Membrane Contact Sites and Reveal Specialization among ERECTA Kinases.** *Developmental cell*  
Ho, C. K., Paciorek, T., Abrash, E., Bergmann, D. C.  
2016; 38 (4): 345-357
- **Grasses use an alternatively wired bHLH transcription factor network to establish stomatal identity.** *Proceedings of the National Academy of Sciences of the United States of America*

- Raissig, M. T., Abrash, E., Bettadapur, A., Vogel, J. P., Bergmann, D. C.  
2016; 113 (29): 8326-8331
- **Arabidopsis CSLD5 Functions in Cell Plate Formation in a Cell Cycle-Dependent Manner.** *Plant cell*  
Gu, F., Bringmann, M., Combs, J. R., Yang, J., Bergmann, D. C., Nielsen, E.  
2016; 28 (7): 1722-1737
  - **50 years of Arabidopsis research: highlights and future directions** *NEW PHYTOLOGIST*  
Provar, N. J., Alonso, J., Assmann, S. M., Bergmann, D., Brady, S. M., Brkljacic, J., Browse, J., Chapple, C., Colot, V., Cutler, S., Dangl, J., Ehrhardt, D., Friesner, et al  
2016; 209 (3): 921-944
  - **Transcriptional control of cell fate in the stomatal lineage.** *Current opinion in plant biology*  
Simmons, A. R., Bergmann, D. C.  
2016; 29: 1-8
  - **MOBE-ChIP: a large-scale chromatin immunoprecipitation assay for cell type-specific studies** *PLANT JOURNAL*  
Lau, O. S., Bergmann, D. C.  
2015; 84 (2): 443-450
  - **Transcriptome Dynamics of the Stomatal Lineage: Birth, Amplification, and Termination of a Self-Renewing Population** *DEVELOPMENTAL CELL*  
Adrian, J., Chang, J., Ballenger, C. E., Bargmann, B. O., Alassimone, J., Davies, K. A., Lau, O. S., Matos, J. L., Hachez, C., Lanctot, A., Vaten, A., Birnbaum, K. D., Bergmann, et al  
2015; 33 (1): 107-118
  - **Arabidopsis Reduces Growth Under Osmotic Stress by Decreasing SPEECHLESS Protein.** *Plant and cell physiology*  
Kumari, A., Jewaria, P. K., Bergmann, D. C., Kakimoto, T.  
2014; 55 (12): 2037-2046
  - **Functional specialization of stomatal bHLHs through modification of DNA-binding and phosphoregulation potential** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Davies, K. A., Bergmann, D. C.  
2014; 111 (43): 15585-15590
  - **Irreversible fate commitment in the Arabidopsis stomatal lineage requires a FAMA and RETINOBLASTOMA-RELATED module** *ELIFE*  
Matos, J. L., Lau, O. S., Hachez, C., Cruz-Ramirez, A., Scheres, B., Bergmann, D. C.  
2014; 3
  - **Patterning and processes: how stomatal development defines physiological potential** *CURRENT OPINION IN PLANT BIOLOGY*  
Dow, G. J., Bergmann, D. C.  
2014; 21: 67-74
  - **Patterning and processes: how stomatal development defines physiological potential.** *Current opinion in plant biology*  
Dow, G. J., Bergmann, D. C.  
2014; 21: 67-74
  - **Direct roles of SPEECHLESS in the specification of stomatal self-renewing cells** *SCIENCE*  
Lau, O. S., Davies, K. A., Chang, J., Adrian, J., Rowe, M. H., Ballenger, C. E., Bergmann, D. C.  
2014; 345 (6204): 1605-1609
  - **Coordinating cell polarity: heading in the right direction?** *DEVELOPMENT*  
Axelrod, J. D., Bergmann, D. C.  
2014; 141 (17): 3298-3302
  - **Manipulation of Mitogen-Activated Protein Kinase Kinase Signaling in the Arabidopsis Stomatal Lineage Reveals Motifs That Contribute to Protein Localization and Signaling Specificity** *PLANT CELL*  
Lampard, G. R., Wengier, D. L., Bergmann, D. C.  
2014; 26 (8): 3358-3371
  - **Omics and modelling approaches for understanding regulation of asymmetric cell divisions in arabidopsis and other angiosperm plants** *ANNALS OF BOTANY*

- Kajala, K., Ramakrishna, P., Fisher, A., Bergmann, D. C., De Smet, I., Sozzani, R., Weijers, D., Brady, S. M.  
2014; 113 (7): 1083-1105
- **An integrated model of stomatal development and leaf physiology** *NEW PHYTOLOGIST*  
Dow, G. J., Bergmann, D. C., Berry, J. A.  
2014; 201 (4): 1218-1226
  - **The physiological importance of developmental mechanisms that enforce proper stomatal spacing in *Arabidopsis thaliana*** *NEW PHYTOLOGIST*  
Dow, G. J., Berry, J. A., Bergmann, D. C.  
2014; 201 (4): 1205-1217
  - **Convergence of stem cell behaviors and genetic regulation between animals and plants: insights from the *Arabidopsis thaliana* stomatal lineage.** *F1000prime reports*  
Matos, J. L., Bergmann, D. C.  
2014; 6: 53-?
  - **A map of cell type-specific auxin responses** *MOLECULAR SYSTEMS BIOLOGY*  
Bergmann, B. O., Vanneste, S., Krouk, G., Nawy, T., Efroni, I., Shani, E., Choe, G., Friml, J., Bergmann, D. C., Estelle, M., Birnbaum, K. D.  
2013; 9
  - **Stomatal development: a plant's perspective on cell polarity, cell fate transitions and intercellular communication** *DEVELOPMENT*  
Lau, O. S., Bergmann, D. C.  
2012; 139 (20): 3683-3692
  - **Mechanisms of stomatal development: an evolutionary view** *EVODEVO*  
Vaten, A., Bergmann, D. C.  
2012; 3
  - **Brassinosteroid regulates stomatal development by GSK3-mediated inhibition of a MAPK pathway** *NATURE*  
Kim, T., Michniewicz, M., Bergmann, D. C., Wang, Z.  
2012; 482 (7385): 419-U1526
  - **On fate and flexibility in stomatal development.** *Cold Spring Harbor symposia on quantitative biology*  
Wengier, D. L., Bergmann, D. C.  
2012; 77: 53-62
  - **Generation of spatial patterns through cell polarity switching.** *Science*  
Robinson, S., Barbier de Reuille, P., Chan, J., Bergmann, D., Prusinkiewicz, P., Coen, E.  
2011; 333 (6048): 1436-1440
  - **Generation of Spatial Patterns Through Cell Polarity Switching** *SCIENCE*  
Robinson, S., de Reuille, P. B., Chan, J., Bergmann, D., Prusinkiewicz, P., Coen, E.  
2011; 333 (6048): 1436-1440
  - **Generation of Signaling Specificity in *Arabidopsis* by Spatially Restricted Buffering of Ligand-Receptor Interactions** *PLANT CELL*  
Abrash, E. B., Davies, K. A., Bergmann, D. C.  
2011; 23 (8): 2864-2879
  - **Peptide Signaling in Plant Development** *CURRENT BIOLOGY*  
Katsir, L., Davies, K. A., Bergmann, D. C., Laux, T.  
2011; 21 (9): R356-R364
  - **Sequence and function of basic helix-loop-helix proteins required for stomatal development in *Arabidopsis* are deeply conserved in land plants** *EVOLUTION & DEVELOPMENT*  
MacAlister, C. A., Bergmann, D. C.  
2011; 13 (2): 182-192
  - **Differentiation of *Arabidopsis* Guard Cells: Analysis of the Networks Incorporating the Basic Helix-Loop-Helix Transcription Factor, FAMA** *PLANT PHYSIOLOGY*  
Hachez, C., Ohashi-Ito, K., Dong, J., Bergmann, D. C.  
2011; 155 (3): 1458-1472

- **The secret to life is being different: asymmetric divisions in plant development** *CURRENT OPINION IN PLANT BIOLOGY*  
Paciorek, T., Bergmann, D. C.  
2010; 13 (6): 661-669
- **Complex signals for simple cells: the expanding ranks of signals and receptors guiding stomatal development** *CURRENT OPINION IN PLANT BIOLOGY*  
Rowe, M. H., Bergmann, D. C.  
2010; 13 (5): 548-555
- **MSP Domain-Containing Protein Reveals A New Level of Regulation of Stomatal Signaling in Arabidopsis**  
Paciorek, T., Abrash, E., Bergmann, D.  
SPRINGER.2010: S149–S150
- **From molecule to model, from environment to evolution: an integrated view of growth and development** *CURRENT OPINION IN PLANT BIOLOGY*  
Bergmann, D. C., Fleming, A. J.  
2010; 13 (1): 1-4
- **Regional specification of stomatal production by the putative ligand CHALLAH** *DEVELOPMENT*  
Abrash, E. B., Bergmann, D. C.  
2010; 137 (3): 447-455
- **STOMATAL PATTERNING AND DEVELOPMENT** *PLANT DEVELOPMENT*  
Dong, J., Bergmann, D. C.  
2010; 91: 267-297
- **Plant asymmetric cell division regulators: pinch-hitting for PARs?** *F1000 biology reports*  
Metzinger, C. A., Bergmann, D. C.  
2010; 2
- **Novel and Expanded Roles for MAPK Signaling in Arabidopsis Stomatal Cell Fate Revealed by Cell Type-Specific Manipulations** *PLANT CELL*  
Lampard, G. R., Lukowitz, W., Ellis, B. E., Bergmann, D. C.  
2009; 21 (11): 3506-3517
- **Orthologs of Arabidopsis thaliana stomatal bHLH genes and regulation of stomatal development in grasses** *DEVELOPMENT*  
Liu, T., Ohashi-Ito, K., Bergmann, D. C.  
2009; 136 (13): 2265-2276
- **BASL Controls Asymmetric Cell Division in Arabidopsis** *CELL*  
Dong, J., MacAlister, C. A., Bergmann, D. C.  
2009; 137 (7): 1320-1330
- **Asymmetric Cell Divisions: A View from Plant Development** *DEVELOPMENTAL CELL*  
Abrash, E. B., Bergmann, D. C.  
2009; 16 (6): 783-796
- **Asymmetry and pattern in the leaf epidermis** *Annual Meeting of the Society-for-Experimental-Biology*  
Bergmann, D., Dong, J., Lampard, G., MacAlister, C., Hachez, C., Rowe, M., Metzinger, C.  
ELSEVIER SCIENCE INC.2009: S176–S176
- **Arabidopsis Stomatal Initiation Is Controlled by MAPK-Mediated Regulation of the bHLH SPEECHLESS** *SCIENCE*  
Lampard, G. R., MacAlister, C. A., Bergmann, D. C.  
2008; 322 (5904): 1113-1116
- **Regulation of the Arabidopsis root vascular initial population by LONESOME HIGHWAY** *DEVELOPMENT*  
Ohashi-Ito, K., Bergmann, D. C.  
2007; 134 (16): 2959-2968
- **The secretory peptide gene EPF1 enforces the stomatal one-cell-spacing rule** *GENES & DEVELOPMENT*  
Hara, K., Kajita, R., Torii, K. U., Bergmann, D. C., Kakimoto, T.  
2007; 21 (14): 1720-1725

- **Transcription factor control of asymmetric cell divisions that establish the stomatal lineage** *NATURE*  
MacAlister, C. A., Ohashi-Ito, K., Bergmann, D. C.  
2007; 445 (7127): 537-540
- **Stomatal development** *ANNUAL REVIEW OF PLANT BIOLOGY*  
Bergmann, D. C., Sack, F. D.  
2007; 58: 163-181
- **Arabidopsis FAMA controls the final proliferation/differentiation switch during stomatal development** *PLANT CELL*  
Ohashi-Ito, K., Bergmann, D. C.  
2006; 18 (10): 2493-2505
- **Stomatal development: from neighborly to global communication** *CURRENT OPINION IN PLANT BIOLOGY*  
Bergmann, D.  
2006; 9 (5): 478-483
- **Stomatal development and pattern controlled by a MAPKK kinase** *SCIENCE*  
Bergmann, D. C., Lukowitz, W., Somerville, C. R.  
2004; 304 (5676): 1494-1497
- **Integrating signals in stomatal development** *CURRENT OPINION IN PLANT BIOLOGY*  
Bergmann, D. C.  
2004; 7 (1): 26-32