

On the Cover: The cover for this Focus Issue on Cellular Dynamics depicts a collage of images from featured articles. The descriptions of the images from left to right are as follows. Image 1: The Arabidopsis protein INP1 (green) assembles into three distinct domains of the plasma membrane in tetrad-stage microspores. The microspores (magenta) are held together by the callose wall (blue). INP1 localization predicts the sites of aperture formation on the surface of mature pollen grains. Image 2 (Central Image): Microtubule growth trajectories on the light grown hypocotyl cell face color coded for apical directed (yellow), basal-directed down (magenta), left (green) and right (cyan). Image 3: Volume rendering of the microtubules (green) and plasma membrane (magenta) in a field of leaf epidermal pavement cells in the process of lobe formation. Image 4 (second row): Filaments formed by the chloroplast division protein FtsZ1 from *Oryza sativa* expressed in a heterologous yeast system. The dashed line represents the outline of the imaged cell. Image 5: A meristem of an Arabidopsis thaliana root expressing the SHORT-ROOT-GFP which is used to analyze the mechanisms of intercellular transport during development. Background Image: Arabidopsis cotyledon pavement cells expressing GFP-PTS1 and stained with propidium iodine. Images created by Zvi Spiegelman, Sidney L. Shaw, Dan Szymanski, Samuel A. Belteton, Kathy Osteryoung, Allan D. TerBush, Anna Dobritsa, and Elizabeth Frick.

THANK YOU TO REVIEWERS

An acknowledgment of *Plant Physiology* reviewers.

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FOCUS ISSUE

EDITORIAL

Cellular Dynamics: Cellular Systems in the Time Domain *Dan Szymanski, Diane Bassham, Teun Munnik, and Wataru Sakamoto*

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^[OPEN]Interplay between Ions, the Cytoskeleton, and Cell Wall Properties during Tip Growth. *Carlisle S. Bascom Jr., Peter K. Hepler, and Magdalena Bezanilla*

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^[OPEN]ROP GTPases Structure-function and Signaling Pathways. *Gil Feiguelman, Ying Fu, and Shaul Yalovsky*

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[^{OPEN}] Three-Dimensional Analysis of Chloroplast Structures Associated with Virus Infection. *Xuejiao Jin, Zhihao Jiang, Kun Zhang, Pengfei Wang, Xiuling Cao, Ning Yue, Xueting Wang, Xuan Zhang, Yunqin Li, Dawei Li, Byung-Ho Kang, and Yongliang Zhang*

Three-dimensional visualization identifies structural remodeling in chloroplasts during barley stripe mosaic virus infection. 282

RESEARCH ARTICLES

[^{OPEN}] Conserved Dynamics of Chloroplast Cytoskeletal FtsZ Proteins Across Photosynthetic Lineages. *Allan D. TerBush, Joshua S. MacCready, Cheng Chen, Daniel C. Ducat, and Katherine W. Osteryoung*

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[^{CC-BY}] Auxin and ROP GTPase Signaling of Polar Nuclear Migration in Root Epidermal Hair Cells. *Moritaka Nakamura, Andrea R. Claes, Tobias Grebe, Rebecca Hermkes, Corrado Viotti, Yoshihisa Ikeda, and Markus Grebe*

Auxin and ROP signaling affect nuclear migration in root epidermal cells. 378

^[CC-BY] KinG Is a Plant-Specific Kinesin That Regulates Both Intra- and Intercellular Movement of SHORT-ROOT. *Ziv Spiegelman, Chin-Mei Lee, and Kimberly L. Gallagher*

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Efficient ER Fusion Requires a Dimerization and a C-Terminal Tail Mediated Membrane Anchoring of RHD3. *Jiaqi Sun and Huanquan Zheng*

Efficient ER membrane fusion requires dimerization of RHD3 in different ER membranes and an interaction between membrane lipids and the C-terminal amphipathic helix of RHD3.

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^[OPEN] Division Plane Orientation Defects Revealed by a Synthetic Double Mutant Phenotype. *Ricardo Mir, Victoria H. Morris, Henrik Buschmann, and Carolyn G. Rasmussen*

The tangled1air9 double mutant had synthetic division plane orientation and root growth and cell file rotation defects that are rescued by full-length TAN1-YFP and only partially by TAN1-YFP deletion constructs.

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^[OPEN] Reassessing the Roles of PIN Proteins and Anticlinal Microtubules during Pavement Cell Morphogenesis. *Samuel A. Belteton, Megan G. Sawchuk, Bryon S. Donohoe, Enrico Scarpella, and Daniel B. Szymanski*

Neither PINs nor stable anticlinal microtubules define the lobing patterns of pavement cells; broader analyses of microtubules and cell wall strain are needed.

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Constraint-based modeling gives insights into dynamic metabolic demands and compartmentalization in a photosynthetic eukaryote.

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A modified virus vector facilitates plant gene fragment retention and improves gene-silencing phenotypes in the host. 496

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[OPEN] Coexpression Analysis Identifies Two Oxidoreductases Involved in the Biosynthesis of the Monoterpene Acid Moiety of Natural Pyrethrin Insecticides in *Tanacetum cinerariifolium*. *Haiyang Xu, Gaurav D. Moghe, Krystle Wiegert-Rininger, Anthony L. Schilmiller, Cornelius S. Barry, Robert L. Last, and Eran Pichersky*

A set of dehydrogenases are involved in the synthesis of trans-chrysanthemic acid, the terpene moiety of the natural insecticide pyrethrins. 524

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[OPEN] A Mucin-like Protein of Planthopper is Required for Feeding and Induces Immunity Response in Plants. *Xinxin Shangguan, Jing Zhang, Bingfang Liu, Yan Zhao, Huiying Wang, Zhizheng Wang, Jianping Guo, Weiwei Rao, Shengli Jing, Wei Guan, Yinhua Ma, Yan Wu, Liang Hu, Rongzhi Chen, Bo Du, Lili Zhu, Dazhao Yu, and Guangcun He*

A secreted mucin-like protein in the rice brown planthopper (Nilaparvata lugens) enables insect feeding and induces plant immune responses.

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[OPEN] Distinct Functions of STARCH SYNTHASE 4 Domains in Starch Granule Formation. *Kuan-Jen Lu, Barbara Pfister, Camilla Jenny, Simona Eicke, and Samuel C. Zeeman*

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[OPEN] Gradually Decreasing Starch Branching Enzyme Expression Is Responsible for the Formation of Heterogeneous Starch Granules. *Juan Wang, Pan Hu, Lingshang Lin, Zichun Chen, Qiaoquan Liu, and Cunxu Wei*

Starch-branching enzyme expression is responsible for the formation of four heterogeneous starch granules distributed regionally from inside to outside in high-amylose rice endosperm.

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[OPEN] A Program for Iron Economy during Deficiency Targets Specific Fe Proteins. *Laura J. Hantzis, Gretchen E. Kroh, Courtney E. Jahn, Michael Cantrell, Graham Peers, Marinus Pilon, and Karl Ravet*

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[OPEN] Regulation of Sucrose Transporters and Phloem Loading in Response to Environmental Cues. *Qiyu Xu, Siyuan Chen, Ren Yunjuan, Shaolin Chen, and Johannes Liesche*

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[OPEN] Vessel-Specific Reintroduction of CINNAMOYL COA REDUCTASE 1 (CCR1) in Dwarfed *ccr1* Mutants Restores Vessel and Xylary Fiber Integrity and Increases Biomass. *Barbara De Meester, Lisanne de Vries, Merve Özparpucu, Notburga Gierlinger, Sander Corneillie, Andreas Pallidis, Geert Goeminne, Kris Morreel, Michiel De Bruyne, Riet De Rycke, Ruben Vanholme, and Wout Boerjan*

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A Model of Leaf Coordination to Scale-up Leaf Expansion from the Organ to the Canopy. *Pierre Martre and Anaëlle Dambreville*

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[OPEN]A Role for the F-Box Protein HAWAIIAN SKIRT in Plant microRNA Function. *Patricia L. M. Lang, Michael D. Christie, Ezgi S. Dogan, Rebecca Schwab, Jörg Hagemann, Anna-Lena van de Weyer, Emanuele Scacchi, and Detlef Weigel*

HAWAIIAN SKIRT is a cofactor for Arabidopsis thaliana microRNA function and acts in an F-box-dependent manner. 730

TsNAC1 Is a Key Transcription Factor in Abiotic Stress Resistance and Growth. *Can Liu, Baomei Wang, Zhaoxia Li, Zhenghua Peng, and Juren Zhang*

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[CC-BY] **SHORTROOT-Mediated Increase in Stomatal Density Has No Impact on Photosynthetic Efficiency.** *Mara L. Schuler, Olga V. Sedelnikova, Berkley J. Walker, Peter Westhoff, and Jane A. Langdale*

Stomatal density can be increased in rice by expanding the expression domain of SHORTROOT, but contrary to theoretical predictions, enhanced stomatal numbers have no impact on photosynthetic capacity. 757

[OPEN] **Transcription Factors VND1-VND3 Contribute to Cotyledon Xylem Vessel Formation.** *Tian Tian Tan, Hitoshi Endo, Ryosuke Sano, Tetsuya Kurata, Masatoshi Yamaguchi, Misato Ohtani, and Taku Demura*

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Balance between Cytosolic and Chloroplast Translation Affects Leaf Variegation. *Ruijuan Wang, Jun Zhao, Min Jia, Ni Xu, Shuang Liang, Jingxia Shao, Yafei Qi, Xiayan Liu, Lijun An, and Fei Yu*

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[OPEN] **Transcription factor OsTGA10 is a target of the MADS protein OsMADS8 and is required for tapetum development.** *Zhi-Shan Chen, Xiao-Feng Liu, Dong-Hui Wang, Rui Chen, Xiao-Lan Zhang, Zhi-Hong Xu, and Shu-Nong Bai*

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A Tonoplast Sugar Transporter Underlies a Sugar Accumulation QTL in Watermelon. *Yi Ren, Shaogui Guo, Jie Zhang, Hongju He, Honghe Sun, Shouwei Tian, Guoyi Gong, Haiying Zhang, Amnon Levi, Yaakov Tadmor, and Yong Xu*

A tonoplast sugar transporter CITST2 is regulated by a sugar-induced WRKY transcription factor SUSIWM1. 836

SIGNALING AND RESPONSE

[OPEN] **Stomatal VPD Response: There Is More to the Story Than ABA.** *Ebe Merilo, Dmitry Yarmolinsky, Pirko Jalakas, Helen Parik, Ingmar Tulva, Bakhtier Rasulov, Kalle Kilk, and Hannes Kollist*

ABA level is important for steady-state stomatal conductance, and OST1 is crucial for humidity-induced stomatal closure. 851

[OPEN] **Arabidopsis Novel Glycine-Rich Plasma Membrane PSS1 Protein Enhances Disease Resistance in Transgenic Soybean Plants.** *Bing Wang, Rishi Sumit, Binod B. Sahu, Micheline N. Ngaki, Subodh K. Srivastava, Yang Yang, Sivakumar Swaminathan, and Madan K. Bhattacharyya*

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The Arabidopsis nonhost resistance gene PSS1 encoding an unknown glycine-rich plasma membrane protein has shown to enhance sudden death syndrome resistance in transgenic soybean plants. 865

[OPEN] *Arabidopsis ACTIN-DEPOLYMERIZING FACTOR3 is Required for Controlling Aphid Feeding from the Phloem.* Hossain A. Mondal, Joe Louis, Lani Archer, Monika Patel, Vamsi J. Nalam, Sujon Sarowar, Vishala Sivapalan, Douglas D. Root, and Jyoti Shah

Green peach aphid feeding from the sieve elements is restricted by ACTIN-DEPOLYMERIZING FACTOR3, implicating an actin-dependent process in controlling insect feeding from the phloem. 879

The RIN-MC Fusion of MADS-Box Transcription Factors Has Transcriptional Activity and Modulates Expression of Many Ripening Genes. Shan Li, Huijinlan Xu, Zheng Ju, Dongyan Cao, Hongliang Zhu, Daqi Fu, Donald Grierson, Guozheng Qin, Yunbo Luo, and Benzhong Zhu

Tomato RIN-MC fusion plays a negative role in ripening and encodes a chimeric transcription factor that modulates the expression of many ripening genes, thereby contributing to the rin mutant phenotype. 891

[OPEN] *Ethylene Receptors Signal via a Noncanonical Pathway to Regulate Abscisic Acid Responses.* Arkadipta Bakshi, Sarbottam Piya, Jessica C. Fernandez, Christian Chervin, Tarek Hewezi, and Brad M. Binder

The ETHYLENE RESPONSE1 and ETHYLENE RESPONSE2 ethylene receptors signal via a noncanonical pathway to control sensitivity to the hormone abscisic acid during seed germination. 910

[OPEN] *OsmiR396d miRNA affects gibberellin and brassinosteroid signaling to regulate plant architecture.* Yongyan Tang, Huanhuan Liu, Siyi Guoa, Bo Wang, Zhitao Li, Kang Chong, and Yunyuan Xu

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Wu H., Cockshutt A.M., McCarthy A., and Campbell D.A. Distinctive Photosystem II Photoinactivation and Protein Dynamics in Marine Diatoms. 960

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