

**On the Cover:** The leaf epidermis manifests some fascinating cell shapes. This rendering is based on a scanning electron micrograph of the epidermis of an Arabidopsis cotyledon and illustrates pairs of kidney-shaped guard cells (red) interspersed between pavement cells which form wavy shapes that interlock into a jigsaw puzzle pattern. The wavy cell contours are an orchestration of the cytoskeleton and cell wall mechanics within development. Image by: Amir J. Bidhendi and Anja Geitmann.

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## UPDATE

[<sup>OPEN</sup>]The Synthetic Biology Toolkit for Photosynthetic Microorganisms. *Konstantinos Vavitsas, Pierre Crozet, Marcos Hamborg Vinde, Fiona Davies, Stéphane D. Lemaire, and Claudia E. Vickers*

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## RESEARCH ARTICLES

### BREAKTHROUGH TECHNOLOGIES

[<sup>OPEN</sup>]Recovering Wind-Induced Plant Motion in Dense Field Environments via Deep Learning and Multiple Object Tracking. *Jonathon A. Gibbs, Alexandra J. Burgess, Michael P. Pound, Tony P. Pridmore, and Erik H. Murchie*

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### BIOCHEMISTRY AND METABOLISM

[<sup>OPEN</sup>]A Conserved Sequence from Heat-Adapted Species Improves Rubisco Activase Thermostability in Wheat. *Andrew P. Scafaro, Nadine Bautsoens, Bart den Boer, Jeroen Van Rie, and Alexander Gallé*

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[<sup>OPEN</sup>]WRINKLED1 Regulates BIOTIN ATTACHMENT DOMAIN-CONTAINING Proteins that Inhibit Fatty Acid Synthesis. *Hui Liu, Zhiyang Zhai, Kate Kuczynski, Jantana Keereetaweep, Jorg Schwender, and John Shanklin*

*WRINKLED1 regulates genes for fatty acid synthesis as well as inhibitors of fatty acid synthesis (BADCs) in a homeostatic mechanism.* 55

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[OPEN] Ectopic Defense Gene Expression Is Associated with Growth Defects in *Medicago truncatula* Lignin Pathway Mutants. Chan Man Ha, Dennis Fine, Anil Bhatia, Xiaolan Rao, Madhavi Z. Martin, Nancy L. Engle, Daniel J. Wherritt, Timothy J. Tschaplinski, Lloyd W. Sumner, and Richard A. Dixon

*Growth defects arising from lignin modification are associated with the extent, but not the nature, of ectopic expression of defense pathways.* 63

[OPEN] eIFiso4G Augments the Synthesis of Specific Plant Proteins Involved in Normal Chloroplast Function. Andrew D. Lellis, Ryan M. Patrick, Laura K. Mayberry, Argelia Lorence, Zachary C. Campbell, Johnna L. Roose, Laurie K. Frankel, Terry M. Bricker, Hanjo A. Hellmann, Roderick W. Mayberry, Ana Solis Zavala, Grace S. Choy, Dennis C. Wylie, Mustafa Abdul-Moheeth, Adeeb Masood, Amy G. Prater, Hailey E. Van Hoorn, Nicola A. Cole, and Karen S. Browning

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[OPEN] Pectin Chemistry and Cellulose Crystallinity Govern Pavement Cell Morphogenesis in a Multi-Step Mechanism. Bara Altartouri, Amir J Bidhendi, Tomomi Tani, Johnny Suzuki, Christina Conrad, Youssef Chebli, Na Liu, Chithra Karunakaran, Giuliano Scarcelli, and Anja Geitmann

*Demethylated pectin is involved in initiating morphogenetic events in pavement cells, and crystalline cellulose plays a role during feedback-mediated augmentation of waviness.* 127

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## GENES, DEVELOPMENT AND EVOLUTION

[OPEN] Wheat TaSPL8 Modulates Leaf Angle Through Auxin and Brassinosteroid Signaling. Kaiye Liu, Jie Cao, Kuohai Yu, Xinye Liu, Yujiao Gao, Qian Chen, Wenjia Zhang, Huiru Peng, Jinkun Du, Mingming Xin, Zhaorong Hu, Weilong Guo, Vincenzo Rossi, Zhongfu Ni, Qixin Sun, and Yingyin Yao

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[OPEN] A Multiprotein Complex Regulates Interference-Sensitive Crossover Formation in Rice. Jie Zhang, Chong Wang, James D. Higgins, Yu-Jin Kim, Sunok Moon, Ki-Hong Jung, Shuying Qu, and Wanqi Liang

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[OPEN] A Vacuolar Phytosiderophore Transporter Alters Iron and Zinc Accumulation in Polished Rice Grains. Jing Che, Kengo Yokosho, Naoki Yamaji, and Jian Feng Ma

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*The circadian clock gene TOC1 functions in shoots, allowing plants to produce seed when water is limited.* 305

[OPEN] Salt Enhances Disease Resistance and Suppresses Cell Death in Ceramide Kinase Mutants. Yu-Bing Yang, Jian Yin, Li-Qun Huang, Jian Li, Ding-Kang Chen, and Nan Yao

*Salt inhibits cell death in *acd5* mutants, partly via a mechanism that depends on salicylic acid-*abscisic acid* interactions, and enhances disease resistance, independent of pathogen-associated molecular pattern-triggered responses.* 319

[OPEN] SPX4 Acts on PHR1-Dependent and -Independent Regulation of Shoot Phosphorus Status in Arabidopsis. Marina Borges Osorio, Sophia Ng, Oliver Berkowitz, Inge De Clercq, Chuanzao Mao, Huixia Shou, James Whelan, and Ricarda Jost

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[<sup>OPEN</sup>] Mutation of a Conserved Motif of PP2C.D Phosphatases Confers SAUR Immunity and Constitutive Activity. *Jeh Haur Wong, Angela K. Spartz, Mee Yeon Park, Minmin Du, and William M. Gray*

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## SYSTEMS AND SYNTHETIC BIOLOGY

[<sup>OPEN</sup>] The Tomato Translational Landscape Revealed by Transcriptome Assembly and Ribosome Profiling. *Hsin-Yen Larry Wu, Gaoyuan Song, Justin W. Walley, and Polly Yingshan Hsu*

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[<sup>OPEN</sup>] Articles can be viewed online without a subscription.