On the Cover: Aphids (Hemiptera: Aphididae) are phloem sap-feeding insects that are important pests of plants. Also, several aphids vector plant viral diseases. Aphids utilize their slender stylets, which are modified mouthparts, to consume phloem sap from sieve elements. As depicted in this illustration, the flexible stylet follows an intercellular path to the sieve elements, thereby minimizing wounding damage to plant tissues. Both antixenotic and antibiotic mechanisms contribute to host defenses against aphids. Antixenotic factors impact insect behavior, for example, the aphid’s ability to find and feed from sieve elements. In comparison, antibiotic factors impact aphid physiology, resulting in adverse effects on insect growth, development, and/or reproduction. The interaction between Arabidopsis (*Arabidopsis thaliana*) and green peach aphid (GPA; *Myzus persicae*) identified Arabidopsis *PHYTOALEXIN-DEFICIENT4* (*P A D4*) as an important modulator of antixenotic and antibiotic defenses against GPA. *P A D4* encodes a protein with homology to α/β-fold acyl hydrolases that include lipases and esterases. *P A D4* is also a component of Arabidopsis defense against pathogens operating with its interacting partner ENHANCED DISEASE SUSCEPTIBILITY1 (*EDS1*). However, *EDS1* is not required for *P A D4*’s involvement in defense against GPA. In this issue, Louis et al. (pp. 1860–1872) demonstrate that mutation of a conserved Ser (S118) in the predicted lipase active site of *P A D4* permits the discrimination of *P A D4* activities in defense against GPA, suggesting that *P A D4* is capable of adopting a number of molecularly and mechanistically different forms, which determine different functions of *P A D4* in fighting aphid infestation. Cover image by Nick Sloff (University Park, PA). The cover image by Nick Sloff includes an aphid image adapted from a drawing by Thomas Degen (www.thomas-degen.ch) and an image of plant cells adapted from a drawing by Kerry Mauck.
## RESEARCH ARTICLES

### BIOCHEMICAL PROCESSES AND MACROMOLECULAR STRUCTURES

**[W][OA]** The Maize Tapetum Employs Diverse Mechanisms to Synthesize and Store Proteins and Flavonoids and Transfer Them to the Pollen Surface.  
Yubing Li, Der Fen Suen, Chien-Yu Huang, Shung-Yee Kung, and Anthony H.C. Huang  
1548–1561

**[W][OA]** A Lipid Droplet Protein of *Nannochloropsis* with Functions Partially Analogous to Plant Oleosins.  
Astrid Vieler, Shane B. Brubaker, Bertrand Vick, and Christoph Benning  
1562–1569

**[W][OA]** Amino Acid Residues Critical for the Specificity for Betaine Aldehyde of the Plant ALDH10 Isoenzyme Involved in the Synthesis of Glycine Betaine.  
Ángel G. Díaz-Sánchez, Lilian González-Segura, Carlos Muñoz-Jiménez, Enrique Rudiño-Piñera, Carmen Montiel, León P Martínez-Castilla, and Rosario A. Muñoz-Clares  
1570–1582

**[C][W]** Subclassification and Biochemical Analysis of Plant Papain-Like Cysteine Proteases Displays Subfamily-Specific Characteristics.  
Kerstin H. Richau, Farnusch Kaschani, Martijn Verdoes, Twinkle C. Pansuriya, Sherry Niessen, Kurt Stüber, Tom Colby, Herman S. Overkleeft, Matthew Boggo, and Renier A.L. Van der Hoorn  
1583–1599

**[C][W]** Natural Hypolignification Is Associated with Extensive Oligolignol Accumulation in Flax Stems.  
Rudy Huis, Kris Morreel, Ophélie Fliniaux, Anca Lucau-Danila, Stéphane Fénart, Sébastien Grec, Godfrey Neutelings, Brigitte Chabbert, François Mesnard, Wout Boerjan, and Simon Hawkins  
1893–1915

**[C][W][OA]** Prunasin Hydrolases during Fruit Development in Sweet and Bitter Almonds.  
1916–1932

**[C][W][OA]** A Revised Architecture of Primary Cell Walls Based on Biomechanical Changes Induced by Substrate-Specific Endoglucanases.  
Yong Bum Park and Daniel J. Cosgrove  
1933–1943

**[W][OA]** The Phosphatidylcholine Diacylglycerol Cholinephosphotransferase Is Required for Efficient Hydroxy Fatty Acid Accumulation in Transgenic Arabidopsis.  
Zhaohui Hu, Zhonghai Ren, and Chaofu Lu  
1944–1954

### BIOENERGETICS AND PHOTOSYNTHESIS

**[C][W]** Photosynthetic Pigment Localization and Thylakoid Membrane Morphology Are Altered in *Synechocystis* 6803 Phycobilisome Mutants.  
Aaron M. Collins, Michelle Liberton, Howland D.T. Jones, Omar F. Garcia, Himadri B. Pakrasi, and Jerilyn A. Timlin  
1600–1609

**[W][OA]** Nucleotide and RNA Metabolism Prime Translational Initiation in the Earliest Events of Mitochondrial Biogenesis during Arabidopsis Germination.  
Simon R. Law, Reena Narsai, Nicolas L. Taylor, Etienne Delannoy, Chris Carrie, Estelle Giraud, A. Harvey Millar, Ian Small, and James Whelan  
1610–1627

### CELL BIOLOGY AND SIGNAL TRANSDUCTION

**[C][W][OA]** The Ubiquitin E3 Ligase LOSS OF GDU2 Is Required for GLUTAMINE DUMPER1-Induced Amino Acid Secretion in Arabidopsis.  
Réjane Pratelli, Damian D. Guerra, Shi Yu, Mark Wogulis, Edward Kraft, Wolf B. Frommer, Judy Callis, and Guillaume Pilot  
1628–1642

**[W][OA]** Siliques Are Red1 from Arabidopsis Acts as a Bidirectional Amino Acid Transporter That Is Crucial for the Amino Acid Homeostasis of Siliques.  
Friederike Ladwig, Mark Stahl, Uwe Ludewig, Axel A. Hirner, Ulrich Z. Hammes, Ruth Studler, Klaus Harter, and Wolfgang Koch  
1643–1655

**[C][W][OA]** The Amino-Terminal Domain of Chloroplast Hsp93 Is Important for Its Membrane Association and Functions in Vivo.  
Chuang-Chih Chu and Hsou-min Li  
1656–1665

**[W][OA]** Characterization of Genes Involved in Cytokinin Signaling and Metabolism from Rice.  
Yu-Chang Tsai, Nicholas R. Weir, Kristine Hill, Wenjing Zhang, Hye Jung Kim, Shin-Han Shiu, G. Eric Schaller, and Joseph J. Kieber  
1666–1684

**[C][W][OA]** Regulatory Functions of SnRK1 in Stress-Responsive Gene Expression and in Plant Growth and Development.  
Young-Hee Cho, Jung-Woo Hong, Eun-Chul Kim, and Sang-Dong Yoo  
1955–1964

**[C][W][OA]** Arabidopsis Hexokinase-Like1 and Hexokinase1 Form a Critical Node in Mediating Plant Glucose and Ethylene Responses.  
Abhijit Karve, Xiaoxia Xia, and Brandon d. Moore  
1965–1975

Continued on next page
DEVELOPMENT AND HORMONE ACTION

[WI][OA] Poppy APETALA1/FRUITFULL Orthologs Control Flowering Time, Branching, Perianth Identity, and Fruit Development. Natalia Pabón-Mora, Barbara A. Ambrose, and Amy Litt 1685–1704

[CI][WI][OA] Reactive Oxygen Species Are Involved in Gibberellin/Abscisic Acid Signaling in Barley Aleurone Cells. Yushi Ishibashi, Tomoya Tawaratsumida, Koji Kondo, Shinsuke Kasa, Masatsugu Sakamoto, Nozomi Aoki, Shao-Hui Zheng, Takashi Yuasa, and Mari Iwaya-Inoue 1705–1714

[WI][OA] Role of cis-12-Oxo-Phytodienoic Acid in Tomato Embryo Development. Stephan Goetz, Anja Hellwege, Irene Stenzel, Claudia Kutter, Valeska Hauptmann, Susanne Forner, Bonnie McCaig, Gerd Hause, Otto Miersch, Claus Wasternack, and Bettina Hause 1715–1727


ENVIRONMENTAL STRESS AND ADAPTATION TO STRESS


[CI][WI][OA] Constitutive Activation of Transcription Factor OsbZIP46 Improves Drought Tolerance in Rice. Ning Tang, Hua Zhang, Xianghua Li, Jinghua Xiao, and Lizhong Xiong 1755–1768

[WI][OA] SCARECROW Has a SHORT-ROOT-Independent Role in Modulating the Sugar Response. Hongchang Cui, Yueming Hao, and Danyu Kong 1769–1778

[CI] Fission Yeast HMT1 Lowers Seed Cadmium through Phytochelatin-Dependent Vacuolar Sequestration in Arabidopsis. Jing Huang, Yu Zhang, Jia-Shi Peng, Chen Zhong, Hong-Ying Yi, David W. Ow, and Ji-Ming Gong 1779–1788

GENETICS, GENOMICS, AND MOLECULAR EVOLUTION


PLANTS INTERACTING WITH OTHER ORGANISMS

[CI][WI][OA] Phytosterols Play a Key Role in Plant Innate Immunity against Bacterial Pathogens by Regulating Nutrient Efflux into the Apoplast. Keri Wang, Muthappa Senthil-Kumar, Choong-Min Ryu, Li Kang, and Kirankumar S. Mysore 1789–1802


[WI][OA] Structure-Function Analysis of the Coiled-Coil and Leucine-Rich Repeat Domains of the RPS5 Disease Resistance Protein. Dong Qi, Brody J. DeYoung, and Roger W. Innes 1819–1832

[CI][WI][OA] Brassinosteroids Antagonize Gibberellin- and Salicylate-Mediated Root Immunity in Rice. David De Vleeschauwer, Ezelien Van Buyten, Kouji Satoh, Johny Balidion, Ramil Mauleon, Il-Ryong Choi, Casiana Vera-Cruz, Shoshi Kikuchi, and Monica Höfte 1833–1846

Continued on next page
SR1, a Calmodulin-Binding Transcription Factor, Modulates Plant Defense and Ethylene-Induced Senescence by Directly Regulating NDR1 and EIN3. Haozhen Nie, Chunzhao Zhao, Guangheng Wu, Yingying Wu, Yongfang Chen, and Dingzhong Tang

Discrimination of Arabidopsis PAD4 Activities in Defense against Green Peach Aphid and Pathogens. Joe Louis, Enrico Gobbato, Hossain A. Mondal, Bart J. Feys, Jane E. Parker, and Jyoti Shah


Low Red/Far-Red Ratios Reduce Arabidopsis Resistance to Botrytis cinerea and Jasmonate Responses via a COI1-JAZ10-Dependent, Salicylic Acid-Independent Mechanism. Ignacio Cerrudo, Mercedes M. Keller, Miriam D. Carguel, Patricia V. Demkura, Mieke de Wit, Micaela S. Patitucci, Ronald Pierik, Corné M.J. Pieterse, and Carlos L. Ballare

The Origin and Composition of Cucurbit “Phloem” Exudate. Cankui Zhang, Xiyan Yu, Brian G. Ayre, and Robert Turgeon

Release of Apical Dominance in Potato Tuber Is Accompanied by Programmed Cell Death in the Apical Bud Meristem. Paula Teper-Bammolker, Yossi Buskila, Yael Lopesco, Shifra Ben-Dor, Inbal Saad, Vered Holdengreber, Eduard Belausov, Hanita Zemach, Naomi Ori, Amnon Lers, and Dani Eshel

Expression of an Entire Bacterial Operon in Plants. Rita Mozes-Koch, Ofer Gover, Edna Tamne, Yuval Peretz, Eyal Maori, Leonid Chernin, and Ilan Sela

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