

**On the Cover:** Molecular oxygen can be partially reduced to different types of reactive oxygen species (ROS) that then impact plant biology in many and various ways. Huang et al. (pages 1551–1559) explain how ROS produced by mitochondria can influence redox signalling, retrograde signalling, plant hormone action, programmed cell death, and defence against pathogens. To illustrate such processes throughout the cell, the cover shows molecular oxygen made of leaves that is disintegrating into various sized molecules to depict the generation of the complex chemical products of oxygen that are the reactive oxygen species. The disintegrating of the leaves also indicates the potentially negative effect of ROS on different aspects of leaf development and function. Artwork was created by Scot Nicholls, who specialises in science artwork for journals and papers (Domokun Design; domokun@inet.net.au).

## FOCUS ISSUE

### EDITORIAL

[OPEN] Recent Progress in Understanding the Role of Reactive Oxygen Species in Plant Cell Signaling. *Karl-Josef Dietz, Ron Mittler, and Graham Noctor* 1535

### COMMENTARY

Aquaporins Link ROS Signaling to Plant Immunity. *Heribert Hirt* 1540

### TOPICAL REVIEW

[OPEN] Redox- and Reactive Oxygen Species-Dependent Signaling into and out of the Photosynthesizing Chloroplast. *Karl-Josef Dietz, Ismail Turkan, and Anja Krieger-Liszkay*

*The photosynthesizing chloroplast functions as a conditional source of redox and ROS information which tunes processes inside the chloroplast and hence impacts on signaling events in the cytosol and nucleus.* 1541

### UPDATES

[OPEN] The Roles of Mitochondrial Reactive Oxygen Species in Cellular Signaling and Stress Response in Plants. *Shaobai Huang, Olivier Van Aken, Markus Schwarzländer, Katharina Belt, and A. Harvey Millar*

*Generation of reactive oxygen species by plant mitochondria contributes to cellular signaling and stress response.* 1551

[OPEN] Production and Scavenging of Reactive Oxygen Species and Redox Signaling during Leaf and Flower Senescence: Similar But Different. *Hilary Rogers and Sergi Munné-Bosch*

*Reactive oxygen species (ROS) play a crucial role in senescing tissues, with some similarities but also important differences in leaves and flowers.* 1560

[OPEN] Reactive Oxygen Species in the Regulation of Stomatal Movements. *Maija Sierla, Cezary Waszczak, Triin Vahisalu, and Jaakko Kangasjärvi*

*Reactive oxygen species play an important role in guard cell signaling leading to stomatal closure and regulate signal amplification and specificity.* 1569

[OPEN] Intracellular Redox Compartmentation and ROS-Related Communication in Regulation and Signaling. *Graham Noctor and Christine H. Foyer*

*Subcellular compartmentation and spatial redox transfer plays a critical role in signaling related to reactive oxygen and antioxidants.* 1581

Continued on next page

Continued from preceding page

<sup>[OPEN]</sup>ROS Regulation of Polar Growth in Plant Cells. *Silvina Mangano, Silvina Paola Denita Juárez, and José M. Estevez*

*ROS act as a key growth signal in root hairs and pollen tubes.* 1593

<sup>[OPEN]</sup>ROS, Calcium, and Electric Signals: Key Mediators of Rapid Systemic Signaling in Plants. *Simon Gilroy, Maciej Białasek, Nobuhiro Suzuki, Magdalena Górecka, Amith R. Devireddy, Stanisław Karpiński, and Ron Mittler*

*ROS, calcium, and electric signals mediate rapid systemic signaling in plants.* 1606

## RESEARCH ARTICLES

<sup>[OPEN]</sup>Singlet Oxygen-Induced Membrane Disruption and Serpin-Protease Balance in Vacuolar-Driven Cell Death. *Eugene Koh, Raanan Carmieli, Avishai Mor, and Robert Fluhr*

*ROS such as singlet oxygen can affect vacuolar membrane integrity bringing about cell death that is further modulated by the balance of lytic proteases and their cognate inhibitors.* 1616

<sup>[OPEN]</sup>Superoxide and Singlet Oxygen Produced within the Thylakoid Membranes Both Cause Photosystem I Photoinhibition. *Daisuke Takagi, Shigeo Takumi, Masaki Hashiguchi, Takehiro Sejima, and Chikahiro Miyake*

*Repetitive short-pulse illumination produces both superoxide and singlet oxygen within the thylakoid membranes, leading to inactivation of photosystem I.* 1626

<sup>[OPEN]</sup>Plant Aquaporin AtPIP1;4 Links Apoplastic H<sub>2</sub>O<sub>2</sub> Induction to Disease Immunity Pathways. *Shan Tian, Xiaobing Wang, Ping Li, Hao Wang, Hongtao Ji, Junyi Xie, Qinglei Qiu, Dan Shen, and Hansong Dong*

*The plasma membrane aquaporin AtPIP1;4 facilitates the diffusion of pathogen-induced apoplastic H<sub>2</sub>O<sub>2</sub> to activate plant immunity.* 1635

<sup>[OPEN]</sup>Phosphorylation of a NAC Transcription Factor by a Calcium/Calmodulin-Dependent Protein Kinase Regulates Abscisic Acid-Induced Antioxidant Defense in Maize. *Yuan Zhu, Jingwei Yan, Weijuan Liu, Lei Liu, Yu Sheng, Yue Sun, Yanyun Li, Henrik Vibe Scheller, Mingyi Jiang, Xilin Hou, Lan Ni, and Aying Zhang*

*The maize protein kinase ZmCCaMK phosphorylates the ZmNAC84 transcription factor at Ser113 during abscisic acid-induced antioxidant.* 1651

<sup>[OPEN]</sup>Peroxisomes Extend Peroxules in a Fast Response to Stress via a Reactive Oxygen Species-Mediated Induction of the Peroxin PEX11a. *María Rodríguez-Serrano, María C. Romero-Puertas, María Sanz-Fernández, Jianping Hu, and Luisa M. Sandalio*

*Dynamic extensions of peroxisomes, or peroxules, are associated with ROS production under stress and require expression of a key peroxin protein.* 1665

Maize OXIDATIVE STRESS2 Homologs Enhance Cadmium Tolerance in Arabidopsis through Activation of a Putative SAM-Dependent Methyltransferase Gene. *Lilong He, Xiaoling Ma, Zhenzhen Li, Zhengli Jiao, Yongqing Li, and David W. Ow*

*Maize homologs of Arabidopsis Oxs2 can interact with the promoter and activate transcription of a gene encoding a putative SAM-dependent methyltransferase, a new factor for enhanced Cd tolerance.* 1675

Continued on next page

The Nitrification Inhibitor Methyl 3-(4-Hydroxyphenyl)Propionate Modulates Root Development by Interfering with Auxin Signaling via the NO/ROS Pathway. *Yangyang Liu, Ruling Wang, Ping Zhang, Qi Chen, Qiong Luo, Yiyong Zhu, and Jin Xu*

*A propionate inhibitor of nitrification inhibits primary root elongation and enhances lateral root formation by promoting auxin metabolism and signaling, and by engaging reactive oxygen species and nitric oxide production.* 1686

[OPEN]Lack of GLYCOLATE OXIDASE1, but Not GLYCOLATE OXIDASE2, Attenuates the Photorespiratory Phenotype of CATALASE2-Deficient Arabidopsis. *Pavel Kerchev, Cezary Waszczak, Aleksandra Lewandowska, Patrick Willems, Alexey Shapiguzov, Zhen Li, Saleh Alseekh, Per Mühlenbock, Frank A. Hoebrichts, Jingjing Huang, Katrien Van Der Kelen, Jaakko Kangasjärvi, Alisdair R. Fernie, Riet De Smet, Yves Van de Peer, Joris Messens, and Frank Van Breusegem*

*Arabidopsis GOX1 and GOX2 have distinct roles under photorespiration-promoting conditions.* 1704

[OPEN]The ROS Wheel: Refining ROS Transcriptional Footprints. *Patrick Willems, Amna Mhamdi, Simon Stael, Veronique Storme, Pavel Kerchev, Graham Noctor, Kris Gevaert, and Frank Van Breusegem*

*Transcriptional footprints during oxidative stress in Arabidopsis.* 1720

[OPEN]Uncoupling High Light Responses from Singlet Oxygen Retrograde Signaling and Spatial-Temporal Systemic Acquired Acclimation. *Melanie Carmody, Peter A. Crisp, Stefano d'Alessandro, Diep Ganguly, Matthew Gordon, Michel Havaux, Verónica Albrecht-Borth, and Barry J. Pogson*

*Uncoupling high light signal perception from distal signal reception shows that 1O<sub>2</sub> EXECUTER-dependent retrograde signaling is required for initiation of systemic acquired acclimation in Arabidopsis.* 1734

A Cotton Annexin Affects Fiber Elongation and Secondary Cell Wall Biosynthesis Associated with Ca<sup>2+</sup> Influx, ROS Homeostasis, and Actin Filament Reorganization. *Feng Zhang, Xuanxiang Jin, Like Wang, Shufen Li, Shuang Wu, Chaoze Cheng, Tianzhen Zhang, and Wangzhen Guo*

*GhFAnnxA promotes Ca<sup>2+</sup> influx, leading to the production of ROS and, together with F-actin activity, affecting fiber development.* 1750

[OPEN]A ROS-Assisted Calcium Wave Dependent on the AtRBOHD NADPH Oxidase and TPC1 Cation Channel Propagates the Systemic Response to Salt Stress. *Matthew J. Evans, Won-Gyu Choi, Simon Gilroy, and Richard J. Morris*

*Mathematical modeling coupled with direct measurement of Ca<sup>2+</sup> and ROS dynamics suggest that ROS-assisted calcium-induced calcium release propagates stress-induced Ca<sup>2+</sup> waves in plants.* 1771

## REGULAR ISSUE

### ON THE INSIDE

*Peter V. Minorsky* 1785

### EDITORIAL

[OPEN]Plant Physiology 90th Anniversary. *Mike Blatt* 1787

### SCIENTIFIC CORRESPONDENCE

[OPEN]Calcium, Metaphors, and Zeitgeist in Plant Sciences. *Christoph Plieth* 1790

Continued on next page

## BREAKTHROUGH TECHNOLOGIES

[OPEN] An Effective Strategy for Reliably Isolating Heritable and Cas9-Free Arabidopsis Mutants Generated by CRISPR/Cas9-Mediated Genome Editing. *Xiuhua Gao, Jilin Chen, Xinhua Dai, Da Zhang, and Yunde Zhao*

*A fluorescence-based visual screen allows fast and efficient isolation of Cas9-free Arabidopsis mutants in the T2 generation.* 1794

[OPEN] Foxtail Mosaic Virus-Induced Gene Silencing in Monocot Plants. *Na Liu, Ke Xie, Qi Jia, Jinping Zhao, Tianyuan Chen, Huangai Li, Xiang Wei, Xianmin Diao, Yiguo Hong, and Yule Liua*

*Foxtail Mosaic Virus-induced gene silencing works in multiple monocot plants including barley, wheat, and foxtail millet.* 1801

Unraveling K63 Polyubiquitination Networks by Sensor-Based Proteomics. *Alexander Johnson and Grégory Vert*

*Sensor-based proteomics allows the identification of proteins carrying specific types of polyubiquitin chains.* 1808

## RESEARCH ARTICLES

### BIOCHEMISTRY AND METABOLISM

Characterization of a New Pink-Fruited Tomato Mutant Results in the Identification of a Null Allele of the SIMYB12 Transcription Factor. *Josefina-Patricia Fernandez-Moreno, Oren Tzfadia, Javier Forment, Silvia Presa, Ilana Rogachev, Sagit Meir, Diego Orzaez, Aspah Aharoni, and Antonio Granell*

*The tomato SIMYB12 transcription factor regulates flavonol glycoside biosynthesis and primary-secondary metabolism homeostasis.* 1821

[OPEN] ZEAXANTHIN EPOXIDASE Activity Potentiates Carotenoid Degradation in Maturing Seed. *Sabrina Gonzalez-Jorge, Payam Mehrshahi, Maria Magallanes-Lundback, Alexander E. Lipka, Ruthie Angelovici, Michael A. Gore, and Dean DellaPenna*

*Zeaxanthin epoxidase-dependent epoxidation of carotenoids accelerates degradation by carotenoid cleavage enzymes during late seed Arabidopsis maturation and seed desiccation.* 1837

[OPEN] Different Functions of the Paralogs to the N-Terminal Domain of the Orange Carotenoid Protein in the Cyanobacterium *Anabaena* sp. PCC 7120. *Rocío López-Igual, Adjélé Wilson, Ryan L. Leverenz, Matthew R. Melnicki, Céline Bourcier de Carbon, Markus Sutter, Aiko Turmo, François Perreau, Cheryl A. Kerfeld, and Diana Kirilovsky*

*The N-terminal domains of the four Orange Carotenoid Protein isoforms defines distinct functions.* 1852

[OPEN] Subcellular Lipid Droplets in Vanilla Leaf Epidermis and Avocado Mesocarp Are Coated with Oleosins of Distinct Phylogenetic Lineages. *Ming-Der Huang and Anthony H. C. Huang*

*Evolutionary plasticity of oleosin-lipid droplets in forming novel structures with unique functions in specific tissues/species is exemplified by those in vanilla leaf epidermis and avocado mesocarp.* 1867

Characterization of Function of the GlgA2 Glycogen/Starch Synthase in *Cyanobacterium* sp. Clg1 Highlights Convergent Evolution of Glycogen Metabolism into Starch Granule Aggregation. *Derifa Kadouche, Mathieu Ducatez, Ugo Cenci, Catherine Tirtiaux, Eiji Suzuki, Yasunori Nakamura, Jean-Luc Putaux, Amandine Durand Terrasson, Sandra Diaz-Troya, Francisco Javier Florencio, Maria Cecilia Arias, Alexander Striebeck, Monica Palcic, Steven G. Ball, and Christophe Colleoni*

*The GlgA2/SSIII/SSIV enzyme is mandatory to obtain polysaccharide aggregation into amylopectin.* 1879

[OPEN]Enzymatic Activity of Xyloglucan Xylosyltransferase 5. *Alan T. Culbertson, Yi-Hsiang Chou, Adrienne L. Smith, Zachary T. Young, Alesia A. Tietze, Sylvain Cottaz, Régis Fauré, and Olga A. Zabolina*

*Arabidopsis Xyloglucan Xylosyltransferase 5 uses an acceptor substrate similar to that of Xylosyltransferases 1 and 2 but at a lower rate.* 1893

[OPEN]The Cell Wall Arabinose-Deficient *Arabidopsis thaliana* Mutant *mur5* Encodes a Defective Allele of REVERSIBLY GLYCOSYLATED POLYPEPTIDE2. *Christopher K. Dugard, Rachel A. Mertz, Catherine Rayon, Davide Mercadante, Christopher Hart, Matheus R. Benatti, Anna T. Olek, Phillip J. SanMiguel, Bruce R. Cooper, Wolf-Dieter Reiter, Maureen C. McCann, and Nicholas C. Carpita*

*The low arabinose mur5 mutant has a missense mutation in the RGP2 UDP-Ara mutase, which makes the furanose form of arabinose in Arabidopsis.* 1905

[OPEN]Cytosolic Glutamine Synthetase Gln1;2 Is the Main Isozyme Contributing to GS1 Activity and Can Be Up-Regulated to Relieve Ammonium Toxicity. *Miao Guan, Thomas C. de Bang, Carsten Pedersen, and Jan K. Schjoerring*

*Cytosolic glutamine synthetase Gln1;2 is the main isozyme contributing to shoot GS1 activity in Arabidopsis and can be up-regulated to relieve ammonium toxicity.* 1921

[OPEN]Primary Fatty Alcohols Are Major Components of Suberized Root Tissues of Arabidopsis in the Form of Alkyl Hydroxycinnamates. *Camille Delude, Laetitia Fouillen, Palash Bhar, Marie-Josée Cardinal, Stephanie Pascal, Patricia Santos, Dylan K. Kosma, Jérôme Joubès, Owen Rowland, and Frédéric Domergue*

*Fatty alcohols that are not covalently linked to the polymer suberin in Arabidopsis roots are soluble waxes in the form of alkyl hydroxycinnamates.* 1934

[OPEN]The Mediator Complex MED15 Subunit Mediates Activation of Downstream Lipid-Related Genes by the WRINKLED1 Transcription Factor. *Mi Jung Kim, In-Cheol Jang, and Nam-Hai Chua*

*MED15 mediates activation of lipid-related genes by WRI1 during seed maturation stages.* 1951

## CELL BIOLOGY

Sorting Motifs Involved in the Trafficking and Localization of the PIN1 Auxin Efflux Carrier. *Gloria Sancho-Andrés, Esther Soriano-Ortega, Caiji Gao, Joan Miquel Bernabé-Orts, Madhumitha Narasimhan, Anna Ophelia Müller, Ricardo Tejos, Liwen Jiang, Jiří Friml, Fernando Aniento, and María Jesús Marcote*

*Phenylalanine 165 is important for PIN1 endocytosis and its trafficking through the secretory pathway.* 1965

[OPEN]VIPP1 Has a Disordered C-Terminal Tail Necessary for Protecting Photosynthetic Membranes against Stress. *Lingang Zhang, Hideki Kondo, Hironari Kamikubo, Mikio Kataoka, and Wataru Sakamoto*

*VIPP1 protein, localized to chloroplast membranes as large complexes in Arabidopsis, confers tolerance to hypotonic and heat-shock stresses through its disordered C-terminal tail.* 1983

A GTPase-Dependent Fine ER Is Required for Localized Secretion in Polarized Growth of Root Hairs.  
*Xingyun Qi, Jiaqi Sun, and Huanqian Zheng*

*An RHD3-dependent fine ER structure at the subapical zone, coordinated with dynamic microtubules, is required for localized secretion to the apical dome of root hairs in growth.* 1996

## ECOPHYSIOLOGY AND SUSTAINABILITY

[OPEN] Linking Turgor with ABA Biosynthesis: Implications for Stomatal Responses to Vapor Pressure Deficit across Land Plants. *Scott A.M. McAdam and Timothy J. Brodribb*

*Small reductions in leaf turgor can trigger foliar ABA biosynthesis in angiosperms, influencing stomatal responses to vapor pressure deficit.* 2008

[OPEN] A WRKY Transcription Factor Regulates Fe Translocation under Fe Deficiency.  
*Jing Ying Yan, Chun Xiao Li, Li Sun, Jiang Yuan Ren, Gui Xin Li, Zhong Jie Ding, and Shao Jian Zheng*

*A WRKY transcription factor promotes root-to-shoot Fe translocation under Fe deficiency via direct regulation of a vacuolar Fe transporter gene in Arabidopsis.* 2017

[OPEN] X-Ray Computed Tomography Reveals the Response of Root System Architecture to Soil Texture.  
*Eric D. Rogers, Daria Monaenkova, Medhavinee Mijar, Apoorva Nori, Daniel I. Goldman, and Philip N. Benfey*

*X-ray computed tomography of rice root system architecture in different substrate textures reveals genotype by environment interactions.* 2028

## GENES, DEVELOPMENT, AND EVOLUTION

Analysis of Chromatin Regulators Reveals Specific Features of Rice DNA Methylation Pathways.  
*Feng Tan, Chao Zhou, Qiangwei Zhou, Shaoli Zhou, Wenjing Yang, Yu Zhao, Guoliang Li, and Dao-Xiu Zhou*

*The methyl-transferases OsDDM1 and OsDRM2 display functional specificities that define distinct DNA methylation pathways in the bulk of DNA methylation of the rice genome.* 2041

[OPEN] Control of Floret Symmetry by RAY3, *SvDIV1B*, and *SvRAD* in the Capitulum of *Senecio vulgaris*.  
*Helena Maria Pereira Garcês, Victoria M. R. Spencer, and Minsung Kim*

*Floral symmetry regulators play antagonistic roles in establishing two distinct floral symmetries within a capitulum in Asteraceae.* 2055

[OPEN] RNA-Seq Links the Transcription Factors AINTEGUMENTA and AINTEGUMENTA-LIKE6 to Cell Wall Remodeling and Plant Defense Pathways. *Beth A. Krizek, Carlton J. Bequette, Kaimei Xu, Ivory C. Blakley, Zheng Qing Fu, Johannes W. Stratmann, and Ann E. Loraine*

*Two related Arabidopsis transcription factors may regulate flower development through effects on the cell wall polysaccharide pectin and act in plant defense pathways.* 2069

[OPEN] Regulatory Role of a Receptor-Like Kinase in Specifying Anther Cell Identity. *Li Yang, Xiaoling Qian, Mingjiao Chen, Qili Fei, Blake C. Meyers, Wanqi Liang, and Dabing Zhang*

*The secretory peptide OsTDL1A interacts with LRR-RLK receptor MSP1 in regulating the formation of inner somatic layers and microsporocytes proliferation via modulating gene expression in rice.* 2085

[OPEN] The Transcription Factor NIN-LIKE PROTEIN7 Controls Border-Like Cell Release.  
*Rucha Karve, Frank Suárez-Román, and Anjali S. Iyer-Pascuzzi*

*A transcription factor regulates the release of border-like cells from the root cap by repressing the expression of cell wall-loosening enzymes in Arabidopsis.* 2101

Continued on next page

## MEMBRANES, TRANSPORT, AND BIOENERGETICS

[OPEN] A Single Amino-Acid Substitution in the Sodium Transporter HKT1 Associated with Plant Salt Tolerance. Akhtar Ali, Natalia Raddatz, Rashid Aman, Songmi Kim, Hyeong Cheol Park, Masood Jan, Dongwon Baek, Irfan Ullah Khan, Dong-Ha Oh, Sang Yeol Lee, Ray A. Bressan, Keun Woo Lee, Albino Maggio, Jose M. Pardo, Hans J. Bohnert, and Dae-Jin Yun

*HKT1-type transporters with an Asp (D) in the second pore-loop domain display inward-rectification and reduced affinity for Na<sup>+</sup>, in contrast to those with Asn (N) in this position that transport Na<sup>+</sup>.* 2112

[OPEN] The Peroxisomal NAD Carrier from Arabidopsis Imports NAD in Exchange with AMP. Carlo W. T. van Roermund, Martin G. Schroers, Jan Wiese, Fabio Facchinelli, Samantha Kurz, Sabrina Wilkinson, Lennart Charton, Ronald J. A. Wanders, Hans R. Waterham, Andreas P. M. Weber, and Nicole Link

*The peroxisomal NAD carrier from Arabidopsis contributes to the NAD homeostasis by supplying peroxisomes with cytosolic NAD in exchange with peroxisomal AMP.* 2127

[OPEN] Chloroplast Membrane Remodeling during Freezing Stress Is Accompanied by Cytoplasmic Acidification Activating SENSITIVE TO FREEZING2. Allison C. Barnes, Christoph Benning, and Rebecca L. Roston

*Cytoplasmic acidification is a specific response to freezing; it contributes to activating freezing-tolerance responses including a lipid remodeling enzyme necessary for freezing tolerance.* 2140

## SIGNALING AND RESPONSE

[OPEN] Mitochondrial and Chloroplast Stress Responses Are Modulated in Distinct Touch and Chemical Inhibition Phases. Olivier Van Aken, Inge De Clercq, Aneta Ivanova, Simon R. Law, Frank Van Breusegem, A. Harvey Millar, and James Whelan

*Mitochondria and chloroplasts adapt to environmental changes via complex transcriptional regulation, the transcription factor ANAC017 regulating chemical inhibition responses and WRKY transcription factors modulating touch responses in Arabidopsis.* 2150

Maize Homologs of CCoAOMT and HCT, Two Key Enzymes in Lignin Biosynthesis, Form Complexes with the NLR Rp1 Protein to Modulate the Defense Response. Guan-Feng Wang and Peter J. Balint-Kurti

*Maize caffeoyl CoA O-methyltransferase and hydroxycinnamoyltransferase proteins, which are key enzymes in lignin biosynthesis, form a complex with NLR Rp1 protein to regulate the hypersensitive defense response.* 2166

[OPEN] The Mobile *bypass* Signal Arrests Shoot Growth by Disrupting Shoot Apical Meristem Maintenance, Cytokinin Signaling, and WUS Transcription Factor Expression. Dong-Keun Lee, David L. Parrott, Emma Adhikari, Nisa Fraser, and Leslie E. Sieburth

*Wild-type shoot WUS expression and cytokinin responses can be repressed by a signal produced by *bps1* mutant roots.* 2178

[OPEN] Defining the SUMO System in Maize: SUMOylation Is Up-Regulated during Endosperm Development and Rapidly Induced by Stress. Robert C. Augustine, Samuel L. York, Thérèse C. Rytz, and Richard D. Vierstra

*The SUMO system in maize encodes conserved and novel machinery and is up-regulated during endosperm development and rapidly induced by stress.* 2191

Continued from preceding page

[OPEN] The Conformation of a Plasma Membrane-Localized Somatic Embryogenesis Receptor Kinase Complex Is Altered by a Potato Aphid-Derived Effector. *Hsuan-Chieh Peng, Sophie Mantelin, Glenn R. Hicks, Frank L. W. Takken, and Isgouhi Kaloshian*

*The plasma membrane-localized receptor kinase SERK1 is present in a complex with the tomato immune receptor Mi-1.2.* 2211

[OPEN] Bacterial AvrRpt2-Like Cysteine Proteases Block Activation of the Arabidopsis Mitogen-Activated Protein Kinases, MPK4 and MPK11. *Lennart Eschen-Lippold, Xiyuan Jiang, James Mitch Elmore, David Mackey, Libo Shan, Gitta Coaker, Dierk Scheel, and Justin Lee*

*Bacterial AvrRpt2-like cysteine proteases specifically suppress flagellin-induced phosphorylation of specific Arabidopsis mitogen-activated protein kinases.* 2223

[OPEN] The *Pseudomonas syringae* Type III Effector HopG1 Induces Actin Remodeling to Promote Symptom Development and Susceptibility during Infection. *Masaki Shimono, Yi-Ju Lu, Katie Porter, Brian H. Kvitko, Jessica Henty-Ridilla, Allison Creason, Sheng Yang He, Jeff H. Chang, Christopher J. Staiger, and Brad Day*

*The P. syringae type III effector protein HopG1 is necessary for disease-related changes in plant actin cytoskeleton organization.* 2239

[OPEN] A Laser Dissection-RNaseq Analysis Highlights the Activation of Cytokinin Pathways by Nod Factors in the *Medicago truncatula* Root Epidermis. *Marie-Françoise Jardinaud, Stéphane Boivin, Nathalie Rodde, Olivier Catrice, Anna Kisiala, Agnes Lepage, Sandra Moreau, Brice Roux, Ludovic Cottret, Erika Sallet, Mathias Brault, R.J. Neil Emery, Jérôme Gouzy, Florian Frugier, and Pascal Gamas*

*Nod factors induce massive reprogramming of gene expression in the root epidermis, including the CRE1 cytokinin pathway which leads to both positive and negative regulation of nodulation.* 2256

[OPEN] Articles can be viewed without a subscription.