

The electronic form of this issue, available as of November 11, 2010, at www.plantphysiol.org, is considered the journal of record.

On the Cover: A hypersensitive-like lesion is shown in the surface of an Arabidopsis (*Arabidopsis thaliana*) leaf stained with aniline blue and pseudocolored to distinguish between different layers. Spontaneous lesions were found to develop as a result of T-DNA disruptions of two genes encoding vacuolar calcium pumps, *ACA4* and *ACA11* (Boursiac et al., pp. 1158–1171). These lesions provide evidence that the vacuole can modulate calcium signals that trigger a programmed cell death pathway. The main image shows a surface view of a lesion reconstructed from a z-stack (300 μm wide, 200 μm deep) taken throughout the leaf. Epidermal cells and the first layer of mesophyll cells are in green; deeper cells are colored in red, blue, and violet. Below are three tridimensional reconstructions of the lesion, shown from different angles. Images and art work by Yann Boursiac with the help of Volker Baeker and the Montpellier Rio Imaging facility.

ON THE INSIDE

Peter V. Minorsky 1015

UPDATE

Seed Cell Wall Storage Polysaccharides: Models to Understand Cell Wall Biosynthesis and Degradation. Marcos Silveira Buckeridge 1017

GENOME ANALYSIS

^{[W][OA]}Digital Gene Expression Signatures for Maize Development. Andrea L. Eveland, Namiko Satoh-Nagasawa, Alexander Goldshmidt, Sandra Meyer, Mary Beatty, Hajime Sakai, Doreen Ware, and David Jackson 1024

^[W]Genome Structures and Halophyte-Specific Gene Expression of the Extremophile *Thellungiella parvula* in Comparison with *Thellungiella salsuginea* (*Thellungiella halophila*) and Arabidopsis. Dong-Ha Oh, Maheshi Dassanayake, Jeffrey S. Haas, Anna Kropornika, Chris Wright, Matilde Paino d'Urzo, Hyewon Hong, Shahjahan Ali, Alvaro Hernandez, Georgina M. Lambert, Gunsu Inan, David W. Galbraith, Ray A. Bressan, Dae-Jin Yun, Jian-Kang Zhu, John M. Cheeseman, and Hans J. Bohnert 1040

^[W]A High-Throughput Data Mining of Single Nucleotide Polymorphisms in *Coffea* Species Expressed Sequence Tags Suggests Differential Homeologous Gene Expression in the Allotetraploid *Coffea arabica*. Ramon Oliveira Vidal, Jorge Maurício Costa Mondego, David Pot, Alinne Batista Ambrósio, Alan Carvalho Andrade, Luiz Filipe Protasio Pereira, Carlos Augusto Colombo, Luiz Gonzaga Esteves Vieira, Marcelo Falsarella Carazzolle, and Gonçalo Amarante Guimarães Pereira 1053

^{[W][OA]}Regulatory Network Identification by Genetical Genomics: Signaling Downstream of the Arabidopsis Receptor-Like Kinase ERECTA. Inez R. Terpstra, L. Basten Snoek, Joost J.B. Keurentjes, Anton J.M. Peeters, and Guido Van den Ackerveken 1067

BREAKTHROUGH TECHNOLOGIES

^{[W][OA]}Nontransgenic Genome Modification in Plant Cells. Ira Marton, Amir Zuker, Elena Shklarman, Vardit Zeevi, Andrey Tovkach, Suzy Roffe, Marianna Ovadis, Tzvi Tzfira, and Alexander Vainstein 1079

^{[C][W][OA]}The Dynamics of Embolism Repair in Xylem: In Vivo Visualizations Using High-Resolution Computed Tomography. Craig R. Brodersen, Andrew J. McElrone, Brendan Choat, Mark A. Matthews, and Kenneth A. Shackel 1088

^[W]High-Throughput Confocal Imaging of Intact Live Tissue Enables Quantification of Membrane Trafficking in Arabidopsis. Susanne Salomon, Dorit Grunewald, Kurt Stüber, Sebastian Schaaf, Dan MacLean, Paul Schulze-Lefert, and Silke Robatzek 1096

Continued on next page

RESEARCH ARTICLES

BIOCHEMICAL PROCESSES AND MACROMOLECULAR STRUCTURES

- [W][OA] Lack of α -Xylosidase Activity in Arabidopsis Alters Xyloglucan Composition and Results in Growth Defects. *Javier Sampedro, Brenda Pardo, Cristina Gianzo, Esteban Guitián, Gloria Revilla, and Ignacio Zarra* 1105
- [W][OA] Identification of a Novel Abscisic Acid-Regulated Farnesol Dehydrogenase from Arabidopsis. *Jayaram Bhandari, A. Heather Fitzpatrick, and Dring N. Crowell* 1116
- [W][OA] The Influence of Fruit Load on the Tomato Pericarp Metabolome in a *Solanum chmielewskii* Introgression Line Population. *Phuc Thi Do, Marion Prudent, Ronan Sulpice, Mathilde Causse, and Alisdair R. Fernie* 1128

BIOENERGETICS AND PHOTOSYNTHESIS

- [W][OA] Mitochondrial Malate Dehydrogenase Lowers Leaf Respiration and Alters Photorespiration and Plant Growth in Arabidopsis. *Tiago Tomaz, Matthieu Bagard, Itsara Pracharoenwattana, Pernilla Lindén, Chun Pong Lee, Adam J. Carroll, Elke Ströher, Steven M. Smith, Per Gardeström, and A. Harvey Millar* 1143

CELL BIOLOGY AND SIGNAL TRANSDUCTION

- [W][OA] Disruption of the Vacuolar Calcium-ATPases in Arabidopsis Results in the Activation of a Salicylic Acid-Dependent Programmed Cell Death Pathway. *Yann Boursiac, Sang Min Lee, Shawn Romanowsky, Robert Blank, Chris Sladek, Woo Sik Chung, and Jeffrey F. Harper* 1158
- [C][W][OA] Pea Chloroplast DnaJ-J8 and Toc12 Are Encoded by the Same Gene and Localized in the Stroma. *Chi-Chou Chiu, Lih-Jen Chen, and Hsou-min Li* 1172

DEVELOPMENT AND HORMONE ACTION

- [W][OA] SHORT-ROOT and SCARECROW Regulate Leaf Growth in Arabidopsis by Stimulating S-Phase Progression of the Cell Cycle. *Stijn Dhondt, Frederik Coppens, Freya De Winter, Kamal Swarup, Roeland M.H. Merks, Dirk Inzé, Malcolm J. Bennett, and Gerrit T.S. Beemster* 1183
- [W][OA] The Autophagic Degradation of Chloroplasts via Rubisco-Containing Bodies Is Specifically Linked to Leaf Carbon Status But Not Nitrogen Status in Arabidopsis. *Masanori Izumi, Shinya Wada, Amane Makino, and Hiroyuki Ishida* 1196
- Functional Interconnection of MYC2 and SPA1 in the Photomorphogenic Seedling Development of Arabidopsis. *Sreeramaiah N. Gangappa, V. Babu Rajendra Prasad, and Sudip Chattopadhyay* 1210
- [W][OA] Two Coordinately Regulated Homologs of FLOWERING LOCUS T Are Involved in the Control of Photoperiodic Flowering in Soybean. *Fanjiang Kong, Baohui Liu, Zhengjun Xia, Shusei Sato, Bo Min Kim, Satoshi Watanabe, Tetsuya Yamada, Satoshi Tabata, Akira Kanazawa, Kyuya Harada, and Jun Abe* 1220

ENVIRONMENTAL STRESS AND ADAPTATION TO STRESS

- [W][OA] Arabidopsis Calcium-Dependent Protein Kinase CPK10 Functions in Abscisic Acid- and Ca^{2+} -Mediated Stomatal Regulation in Response to Drought Stress. *Jun-Jie Zou, Feng-Ju Wei, Cun Wang, Juan-Juan Wu, Disna Ratnasekera, Wen-Xin Liu, and Wei-Hua Wu* 1232
- [OA] Plant Cell Growth in Tissue. *Joseph K.E. Ortega* 1244
- [C][W][OA] Molecular and Physiological Analysis of Drought Stress in Arabidopsis Reveals Early Responses Leading to Acclimation in Plant Growth. *Amal Harb, Arjun Krishnan, Madana M.R. Ambavaram, and Andy Pereira* 1254
- [C][W][OA] MORPHEUS' MOLECULE1 Is Required to Prevent Aberrant RNA Transcriptional Read-Through in Arabidopsis. *Yue Zhou, Jun Zhang, Huixin Lin, Guangqin Guo, and Yan Guo* 1272
- [W][OA] FIBRILLIN4 Is Required for Plastoglobule Development and Stress Resistance in Apple and Arabidopsis. *Dharmendra K. Singh, Siela N. Maximova, Philip J. Jensen, Brian L. Lehman, Henry K. Ngugi, and Timothy W. McNellis* 1281

Continued on next page

- [W][OA] Components Acting Downstream of Short Day Perception Regulate Differential Cessation of Cambial Activity and Associated Responses in Early and Late Clones of Hybrid Poplar. *Lars Resman, Glenn Howe, David Jonsen, Madeleine Englund, Nathalie Druart, Jarmo Schrader, Henrik Antti, Jeff Skinner, Andreas Sjödin, Tony Chen, and Rishikesh P. Bhalerao* 1294
- [C][W][OA] Characterization of the β -Carotene Hydroxylase Gene *DSM2* Conferring Drought and Oxidative Stress Resistance by Increasing Xanthophylls and Abscisic Acid Synthesis in Rice. *Hao Du, Nili Wang, Fei Cui, Xianghua Li, Jinghua Xiao, and Lizhong Xiong* 1304
- [W] Nitric Oxide Is Associated with Long-Term Zinc Tolerance in *Solanum nigrum*. *Jin Xu, Hengxia Yin, Yulong Li, and Xiaojing Liu* 1319

GENETICS, GENOMICS, AND MOLECULAR EVOLUTION

- [C][W] WAVY LEAF1, an Ortholog of Arabidopsis *HEN1*, Regulates Shoot Development by Maintaining MicroRNA and Trans-Acting Small Interfering RNA Accumulation in Rice. *Masashi Abe, Takanori Yoshikawa, Misuzu Nosaka, Hitoshi Sakakibara, Yutaka Sato, Yasuo Nagato, and Jun-ichi Itoh* 1335
- [W] Comparative Analysis of Pistil Transcriptomes Reveals Conserved and Novel Genes Expressed in Dry, Wet, and Semidry Stigmas. *Alexandra M. Allen, Christian Lexer, and Simon J. Hiscock* 1347
- [W][OA] Relationships between Growth, Growth Response to Nutrient Supply, and Ion Content Using a Recombinant Inbred Line Population in Arabidopsis. *Aina E. Prinzenberg, Hugues Barbier, David E. Salt, Benjamin Stich, and Matthieu Raymond* 1361

PLANTS INTERACTING WITH OTHER ORGANISMS

- [W] Auxin Carriers Localization Drives Auxin Accumulation in Plant Cells Infected by *Frankia* in *Casuarina glauca* Actinorhizal Nodules. *Francine Perrine-Walker, Patrick Doumas, Mikael Lucas, Virginie Vaissayre, Nicholas J. Beauchemin, Leah R. Band, Jérôme Chopard, Amandine Crabos, Geneviève Conejero, Benjamin Péret, John R. King, Jean-Luc Verdeil, Valérie Hocher, Claudine Franche, Malcolm J. Bennett, Louis S. Tisa, and Laurent Laplaze* 1372
- [OA] Multiple Roles of Soluble Sugars in the Establishment of *Gunnera-Nostoc* Endosymbiosis. *Hima J. Khamar, Erick K. Breathwaite, Christine E. Prasse, Elizabeth R. Fraley, Craig R. Secor, Fairouz L. Chibane, Jeff Elhai, and Wan-Ling Chiu* 1381
- [OA] The *lss* Supernodulation Mutant of *Medicago truncatula* Reduces Expression of the *SUNN* Gene. *Elise Schnabel, Arijit Mukherjee, Lucinda Smith, Tessema Kassaw, Sharon Long, and Julia Frugoli* 1390
- [W][OA] Arabidopsis Histone Methyltransferase SET DOMAIN GROUP8 Mediates Induction of the Jasmonate/Ethylene Pathway Genes in Plant Defense Response to Necrotrophic Fungi. *Alexandre Berr, Emily J. McCallum, Abdelmalek Alioua, Dimitri Heintz, Thierry Heitz, and Wen-Hui Shen* 1403

SYSTEMS BIOLOGY, MOLECULAR BIOLOGY, AND GENE REGULATION

- [W][OA] Microsatellite Instability in Arabidopsis Increases with Plant Development. *Andrey Golubov, Youli Yao, Priti Maheshwari, Andriy Bilichak, Alex Boyko, François Belzile, and Igor Kovalchuk* 1415
- [W] MYB75 Functions in Regulation of Secondary Cell Wall Formation in the Arabidopsis Inflorescence Stem. *Apurva Bhargava, Shawn D. Mansfield, Hardy C. Hall, Carl J. Douglas, and Brian E. Ellis* 1428
- [C][W][OA] Identification of Putative Stage-Specific Grapevine Berry Biomarkers and Omics Data Integration into Networks. *Anita Zamboni, Mariasole Di Carli, Flavia Guzzo, Matteo Stocchero, Sara Zenoni, Alberto Ferrarini, Paola Tononi, Ketti Toffali, Angiola Desiderio, Kathryn S. Lilley, M. Enrico Pè, Eugenio Benvenuto, Massimo Delledonne, and Mario Pezzotti* 1439
- [C][W][OA] Identification of Tyrosyl-DNA Phosphodiesterase as a Novel DNA Damage Repair Enzyme in Arabidopsis. *So-Young Lee, Hoyeun Kim, Hyun-Ju Hwang, Young-Min Jeong, Sang Hyeon Na, Je-Chang Woo, and Sang-Gu Kim* 1460
- [W][OA] The Purple Cauliflower Arises from Activation of a MYB Transcription Factor. *Li-Wei Chiu, Xiangjun Zhou, Sarah Burke, Xianli Wu, Ronald L. Prior, and Li Li* 1470

- [C][W][OA] Protein Association and Dissociation Regulated by Extension Peptide: A Mode for Iron Control by Phytoferritin in Seeds. *Haixia Yang, Xiaoping Fu, Meiliang Li, Xiaojing Leng, Bin Chen, and Guanghua Zhao* 1481
- [C][W][OA] Arabidopsis Basic Leucine-Zipper Transcription Factors TGA9 and TGA10 Interact with Floral Glutaredoxins ROXY1 and ROXY2 and Are Redundantly Required for Anther Development. *Jhadeswar Murmu, Michael J. Bush, Catherine DeLong, Shutian Li, Mingli Xu, Madiha Khan, Caroline Malcolmson, Pierre R. Fobert, Sabine Zachgo, and Shelley R. Heyworth* 1492
- [C][W] Arsenic Speciation in Phloem and Xylem Exudates of Castor Bean. *Wen-Ling Ye, B. Alan Wood, Jacqueline L. Stroud, P. John Andralojc, Andrea Raab, Steve P. McGrath, Jörg Feldmann, and Fang-Jie Zhao* 1505
- [C][W][OA] Ethylene Suppression of Sugar-Induced Anthocyanin Pigmentation in Arabidopsis. *Seok-Won Jeong, Prasanta Kumar Das, Sae Chae Jeoung, Ji-Young Song, Hyun Kyoung Lee, Yeon-Ki Kim, Woo Jung Kim, Yong Il Park, Sang-Dong Yoo, Sang-Bong Choi, Giltsu Choi, and Youn-Il Park* 1514
- [C][W][OA] Nucleus-Independent Control of the Rubisco Operon by the Plastid-Encoded Transcription Factor Ycf30 in the Red Alga *Cyanidioschyzon merolae*. *Ayumi Minoda, Andreas P.M. Weber, Kan Tanaka, and Shin-ya Miyagishima* 1532
- [C][W][OA] Comparing Symbiotic Efficiency between Swollen versus Nonswollen Rhizobial Bacteroids. *Ryoko Oono and R. Ford Denison* 1541
- [C][W] *Mrt*, a Gene Unique to Fungi, Encodes an Oligosaccharide Transporter and Facilitates Rhizosphere Competency in *Metarhizium robertsii*. *Weiguo Fang and Raymond J. St. Leger* 1549

WHOLE PLANT AND ECOPHYSIOLOGY

- Temperature Response of Isoprene Emission in Vivo Reflects a Combined Effect of Substrate Limitations and Isoprene Synthase Activity: A Kinetic Analysis. *Baltijor Rasulov, Katja Hüve, Irina Bichele, Agu Laisk, and Ülo Niinemets* 1558

[C] Some figures in this article are displayed in color online but in black and white in the print edition.

[W] Indicates Web-only data.

[OA] Open Access articles can be viewed online without a subscription.