

The electronic form of this issue, available as of July 10, 2009, at www.plantphysiol.org, is considered the journal of record.

On the Cover: A photo of a *Physcomitrella* green gametophyte branch with an orange sporophyte growing on top. Insert is a photo of a gametophyte cell after transient expression of a DNA construct encoding BiP-RFP (endoplasmic reticulum [ER] marker, shown in red) and oleosin-GFP (marker of oil bodies and synthesized on extensive regions of the ER, shown in green). All the spherical oil bodies (green) are connected to the ER network (orange-yellow) in the cell. In this issue, Huang et al. (pp. 1192–1203) establish the use of *Physcomitrella* as a transient expression system to study the cell biology of lipid synthesis and storage. No other plant transient expression system containing storage oil bodies has been reported previously. The moss is the most primitive plant containing higher-plant-like storage oil bodies. Its single-cell-layer gametophyte can be easily transformed and observed with confocal microscopy and induced to mutate via homologous recombination.

ON THE INSIDE

Peter V. Minorsky 1107

HIGH IMPACT

How Sweet It Is: Identification of Vacuolar Sucrose Transporters. Aleel K. Grennan and Jeremy Gragg 1109

BREAKTHROUGH TECHNOLOGIES

^{[C][W][OA]}A Versatile Zero Background T-Vector System for Gene Cloning and Functional Genomics. Songbiao Chen, Pattavipha Songkumarn, Jianli Liu, and Guo-Liang Wang 1111

^{[C][W]}A Visual Reporter System for Virus-Induced Gene Silencing in Tomato Fruit Based on Anthocyanin Accumulation. Diego Orzaez, Aurora Medina, Sara Torre, Josefina Patricia Fernández-Moreno, José Luis Rambla, Asun Fernández-del-Carmen, Eugenio Butelli, Cathie Martin, and Antonio Granell 1122

BIOINFORMATICS

^{[C][W][OA]}TriFLDB: A Database of Clustered Full-Length Coding Sequences from Triticeae with Applications to Comparative Grass Genomics. Keiichi Mochida, Takuhiro Yoshida, Tetsuya Sakurai, Yasunari Ogihara, and Kazuo Shinozaki 1135

RESEARCH ARTICLES

BIOCHEMICAL PROCESSES AND MACROMOLECULAR STRUCTURES

^[OA]The Role of Diglycosyl Lipids in Photosynthesis and Membrane Lipid Homeostasis in Arabidopsis. Georg Hölzl, Sandra Witt, Nicole Gaude, Michael Melzer, Mark Aurel Schöttler, and Peter Dörmann 1147

^{[C][W][OA]}Molecular and Biochemical Characterization of the Parvulin-Type PPIases in *Lotus japonicus*. Evangelia D. Kouri, Nikolaos E. Labrou, Spiros D. Garbis, Katerina I. Kalliampakou, Catalina Stedel, Maria Dimou, Michael K. Udvardi, Panagiotis Katinakis, and Emmanouil Fletmetakis 1160

^{[W][OA]}Functional Characterization of the Arabidopsis β -Ketoacyl-Coenzyme A Reductase Candidates of the Fatty Acid Elongase. Frédéric Beaudoin, Xianzhong Wu, Fengling Li, Richard P. Haslam, Jonathan E. Markham, Huanquan Zheng, Johnathan A. Napier, and Ljerka Kunst 1174

^{[W][OA]}Oil Bodies and Oleosins in *Physcomitrella* Possess Characteristics Representative of Early Trends in Evolution. Chien-Yu Huang, Chun-I Chung, Yao-Cheng Lin, Yue-Ie Caroline Hsing, and Anthony H.C. Huang 1192

Continued on next page

- [W][OA] RNA Interference of LIN5 in Tomato Confirms Its Role in Controlling Brix Content, Uncovers the Influence of Sugars on the Levels of Fruit Hormones, and Demonstrates the Importance of Sucrose Cleavage for Normal Fruit Development and Fertility. *María Inés Zanor, Sonia Osorio, Adriano Nunes-Nesi, Fernando Carrari, Marc Lohse, Björn Usadel, Christina Kühn, Wilfried Bleiss, Patrick Giavalisco, Lothar Willmitzer, Ronan Sulpice, Yan-Hong Zhou, and Alisdair R. Fernie* 1204
- [C][W][OA] *AtBXL1* Encodes a Bifunctional β -D-Xylosidase/ α -L-Arabinofuranosidase Required for Pectic Arabinan Modification in Arabidopsis Mucilage Secretory Cells. *Andrej A. Arsovski, Theodore M. Popma, George W. Haughn, Nicholas C. Carpita, Maureen C. McCann, and Tamara L. Western* 1219
- [W] The RNA Hydrolysis and the Cytokinin Binding Activities of PR-10 Proteins Are Differently Performed by Two Isoforms of the Pru p 1 Peach Major Allergen and Are Possibly Functionally Related. *Paola Zubini, Barbara Zambelli, Francesco Musiani, Stefano Ciurli, Paolo Bertolini, and Elena Baraldi* 1235
- [W][OA] The K-Segment of Maize DHN1 Mediates Binding to Anionic Phospholipid Vesicles and Concomitant Structural Changes. *Myong-Chul Koag, Stephan Wilkens, Raymond D. Fenton, Josh Resnik, Evanly Vo, and Timothy J. Close* 1503

BIOENERGETICS AND PHOTOSYNTHESIS

- [W][OA] A Redox-Mediated Modulation of Stem Bolting in Transgenic *Nicotiana sylvestris* Differentially Expressing the External Mitochondrial NADPH Dehydrogenase. *Yun-Jun Liu, Adriano Nunes-Nesi, Sabá V. Wallström, Ida Lager, Agnieszka M. Michalecka, Fredrik E.B. Norberg, Susanne Widell, Kenneth M. Fredlund, Alisdair R. Fernie, and Allan G. Rasmusson* 1248
- [W][OA] LPA66 Is Required for Editing *psbF* Chloroplast Transcripts in Arabidopsis. *Wenhe Cai, Daili Ji, Lianwei Peng, Jinkui Guo, Jinfang Ma, Meijuan Zou, Congming Lu, and Lixin Zhang* 1260
- [W][OA] Refining the Definition of Plant Mitochondrial Presequences through Analysis of Sorting Signals, N-Terminal Modifications, and Cleavage Motifs. *Shaobai Huang, Nicolas L. Taylor, James Whelan, and A. Harvey Millar* 1272
- [C][W][OA] The Transcription Factor ABI4 Is a Regulator of Mitochondrial Retrograde Expression of *ALTERNATIVE OXIDASE1a*. *Estelle Giraud, Olivier Van Aken, Lois H.M. Ho, and James Whelan* 1286
- [C][OA] Loss of the Transit Peptide and an Increase in Gene Expression of an Ancestral Chloroplastic Carbonic Anhydrase Were Instrumental in the Evolution of the Cytosolic C₄ Carbonic Anhydrase in *Flaveria*. *Sandra K. Tanz, Sasha G. Tetu, Nicole G.F. Vella, and Martha Ludwig* 1515

CELL BIOLOGY AND SIGNAL TRANSDUCTION

- [W][OA] The Histidine Kinase-Related Domain of Arabidopsis Phytochrome A Controls the Spectral Sensitivity and the Subcellular Distribution of the Photoreceptor. *Rebecca Müller, Aurora Piñas Fernández, Andreas Hiltbrunner, Eberhard Schäfer, and Thomas Kretsch* 1297
- [W][OA] The Tryptophan Conjugates of Jasmonic and Indole-3-Acetic Acids Are Endogenous Auxin Inhibitors. *Paul E. Staswick* 1310
- [W] Fine-Tuning of the Cytoplasmic Ca²⁺ Concentration Is Essential for Pollen Tube Growth. *Megumi Iwano, Tetsuyuki Entani, Hiroshi Shiba, Mituru Kakita, Takeharu Nagai, Hideaki Mizuno, Atsushi Miyawaki, Tsubasa Shoji, Kenichi Kubo, Akira Isogai, and Seiji Takayama* 1322

DEVELOPMENT AND HORMONE ACTION

- Evidence for a Role of Gibberellins in Salicylic Acid-Modulated Early Plant Responses to Abiotic Stress in Arabidopsis Seeds. *Ana Alonso-Ramírez, Dolores Rodríguez, David Reyes, Jesús Angel Jiménez, Gregorio Nicolás, María López-Climent, Aurelio Gómez-Cadenas, and Carlos Nicolás* 1335
- [C][W][OA] Triple Loss of Function of Protein Phosphatases Type 2C Leads to Partial Constitutive Response to Endogenous Abscisic Acid. *Silvia Rubio, Americo Rodrigues, Angela Saez, Marie B. Dizon, Alexander Galle, Tae-Houn Kim, Julia Santiago, Jaume Flexas, Julian I. Schroeder, and Pedro L. Rodriguez* 1345

ENVIRONMENTAL STRESS AND ADAPTATION TO STRESS

- [W][OA] Sucrose Control of Translation Mediated by an Upstream Open Reading Frame-Encoded Peptide. *Fatemeh Rahmani, Maureen Hummel, Jolanda Schuurmans, Anika Wiese-Klinkenberg, Sjeff Smeeckens, and Johannes Hanson* 1356
- [W][OA] Overexpression of the Transcription Factor AP37 in Rice Improves Grain Yield under Drought Conditions. *Se-Jun Oh, Youn Shic Kim, Chang-Woo Kwon, Hye Kyong Park, Jin Seo Jeong, and Ju-Kon Kim* 1368
- [C][W][OA] Senescence-Induced Serotonin Biosynthesis and Its Role in Delaying Senescence in Rice Leaves. *Kiyoon Kang, Young-Soon Kim, Sangkyu Park, and Kyoungwhan Back* 1380
- [W] The Role of Annexin 1 in Drought Stress in Arabidopsis. *Dorota Konopka-Postupolska, Greg Clark, Grazyna Goch, Janusz Debski, Krzysztof Floras, Araceli Cantero, Bartłomiej Fijolek, Stanley Roux, and Jacek Hennig* 1394
- [W][OA] Cytokinin-Dependent Photorespiration and the Protection of Photosynthesis during Water Deficit. *Rosa M. Rivero, Vladimir Shulaev, and Eduardo Blumwald* 1530
- [C][W][OA] Identification of Nutrient-Responsive Arabidopsis and Rapeseed MicroRNAs by Comprehensive Real-Time Polymerase Chain Reaction Profiling and Small RNA Sequencing. *Bikram Datt Pant, Magdalena Musialak-Lange, Przemyslaw Nuc, Patrick May, Anja Buhtz, Julia Kehr, Dirk Walther, and Wolf-Rüdiger Scheible* 1541

GENETICS, GENOMICS, AND MOLECULAR EVOLUTION

- [C][W] The Organization Pattern of Root Border-Like Cells of Arabidopsis Is Dependent on Cell Wall Homogalacturonan. *Caroline Durand, Maïté Vicré-Gibouin, Marie Laure Follet-Gueye, Ludovic Duponchel, Myriam Moreau, Patrice Lerouge, and Azeddine Driouch* 1411

PLANTS INTERACTING WITH OTHER ORGANISMS

- [OA] Isolation and Characterization of Hydroxyproline-Rich Glycopeptide Signals in Black Nightshade Leaves. *Gregory Pearce, Ramcharan Bhattacharya, Yu-Chi Chen, Guido Barona, Yube Yamaguchi, and Clarence A. Ryan* 1422
- [W][OA] Ripening-Regulated Susceptibility of Tomato Fruit to *Botrytis cinerea* Requires NOR But Not RIN or Ethylene. *Dario Cantu, Barbara Blanco-Ulate, Liya Yang, John M. Labavitch, Alan B. Bennett, and Ann L.T. Powell* 1434
- [W] Abscisic Acid Negatively Regulates Elicitor-Induced Synthesis of Capsidiol in Wild Tobacco. *Alexis Samba Mialoundama, Dimitri Heintz, Delphine Debayle, Alain Rahier, Bilal Camara, and Florence Bouvier* 1556
- [C][OA] Identification of Chlorogenic Acid as a Resistance Factor for Thrips in Chrysanthemum. *Kirsten A. Leiss, Federica Maltese, Young Hae Choi, Robert Verpoorte, and Peter G.L. Klinkhamer* 1567
- [W][OA] Different Lepidopteran Elicitors Account for Cross-Talk in Herbivory-Induced Phytohormone Signaling. *Celia Diezel, Caroline C. von Dahl, Emmanuel Gaquerel, and Ian T. Baldwin* 1576

WHOLE PLANT AND ECOPHYSIOLOGY

- [OA] Giant Flowers of Southern Magnolia Are Hydrated by the Xylem. *Taylor S. Feild, David S. Chatelet, and Tim J. Brodribb* 1587

SYSTEMS BIOLOGY, MOLECULAR BIOLOGY, AND GENE REGULATION

- [W][OA] Two Alternatively Spliced Isoforms of the Arabidopsis SR45 Protein Have Distinct Roles during Normal Plant Development. *Xiao-Ning Zhang and Stephen M. Mount* 1450
- [C][W][OA] cis-Element- and Transcriptome-Based Screening of Root Hair-Specific Genes and Their Functional Characterization in Arabidopsis. *Su-Kyung Won, Yong-Ju Lee, Ha-Yeon Lee, Yoon-Kyung Heo, Misuk Cho, and Hyung-Taeg Cho* 1459
- [W] Plant Physiological Adaptations to the Massive Foreign Protein Synthesis Occurring in Recombinant Chloroplasts. *Julia Bally, Marie Nadai, Maxime Vitel, Anne Rolland, Raphael Dumain, and Manuel Dubald* 1474
- [W][OA] CDKB1;1 Forms a Functional Complex with CYCA2;3 to Suppress Endocycle Onset. *Véronique Boudolf, Tim Lammens, Joanna Boruc, Jelle Van Leene, Hilde Van Den Daele, Sara Maes, Gert Van Isterdael, Eugenia Russinova, Eva Kondorosi, Erwin Witters, Geert De Jaeger, Dirk Inzé, and Lieven De Veylder* 1482

Continued from preceding page

- ^[W]^[OA] Arabidopsis Encodes Four tRNase Z Enzymes. *Giusy Canino, Edyta Bocian, Nicolas Barbezier, Manuel Echeverría, Joachim Forner, Stefan Binder, and Anita Marchfelder* 1494
- Processing of a Dicistronic tRNA-snoRNA Precursor: Combined Analysis in Vitro and in Vivo Reveals Alternate Pathways and Coupling to Assembly of snoRNP. *Nicolas Barbezier, Giusy Canino, Julie Rodor, Edouard Jobet, Julio Saez-Vasquez, Anita Marchfelder, and Manuel Echeverría* 1598
- ^[W] FRIGIDA Delays Flowering in Arabidopsis via a Cotranscriptional Mechanism Involving Direct Interaction with the Nuclear Cap-Binding Complex. *Nuno Geraldo, Isabel Bäurle, Shin-ichiro Kidou, Xiangyang Hu, and Caroline Dean* 1611

CORRECTIONS

- Phosphatidylinositol (4,5)Bisphosphate Inhibits K⁺-Efflux Channel Activity in NT1 Tobacco Cultured Cells. *X. Ma, O. Shor, S. Diminshtein, L. Yu, Y.J. Im, I. Perera, A. Lomax, W.F. Boss, and N. Moran* 1619

^[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.