

The electronic form of this issue, available as of May 11, 2011, at www.plantphysiol.org, is considered the journal of record.

On the Cover: A fast neutron mutant population resource has been created in soybean (*Glycine max*), and phenotypic and genomic analyses have been conducted for connecting gene to function. The top photo shows rows in a field plot of individual M2 plants that comprise a portion of more than 23,000 individual lines in the soybean fast neutron mutant population, described by Bolon et al. (pp. 240–253) in this issue. A mutant plant with stunted growth and chlorotic leaf color can be seen in the right foreground. Beneath are three rows of photographs that show several mutant and wild-type Minnesota cv M92-220 soybean plants. Upper row, left to right: a short trichome mutant pod versus wild-type pod, a lanceolate leaf mutant, and a short petiole mutant with curled and crinkled leaves. Second row, left to right: a wild-type flower, a mutant with reduced pod formation, and a chimeric leaf mutant. Bottom row, left to right: wild-type nodulating roots, chlorotic-tinged leaf mutant, and wild-type seed. Cover design and photographs by Y. Bolon, B. Bucciarelli, R. Schirmer, J. Roessler, G. Bascur, and C. Vance.

ON THE INSIDE

Peter V. Minorsky

1

UPDATES

^[W]^[OA]UDP-Sugar Pyrophosphorylase: A New Old Mechanism for Sugar Activation. *Leszek A. Kleczkowski, Daniel Decker, and Malgorzata Wilczynska*

3

Role of the Extensin Superfamily in Primary Cell Wall Architecture. *Derek T.A. Lamport, Marcia J. Kieliszewski, Yuning Chen, and Maura C. Cannon*

11

GENOME ANALYSIS

^[W]^[OA]Comprehensive Sequence Analysis of 24,783 Barley Full-Length cDNAs Derived from 12 Clone Libraries. *Takashi Matsumoto, Tsuyoshi Tanaka, Hiroaki Sakai, Naoki Amano, Hiroyuki Kanamori, Kanako Kurita, Ari Kikuta, Kozue Kamiya, Mayu Yamamoto, Hiroshi Ikawa, Nobuyuki Fujii, Kiyosumi Hori, Takeshi Itoh, and Kazuhiro Sato*

20

RESEARCH ARTICLES

BIOCHEMICAL PROCESSES AND MACROMOLECULAR STRUCTURES

^[W]Overexpression of Arabidopsis *ECERIFERUM1* Promotes Wax Very-Long-Chain Alkane Biosynthesis and Influences Plant Response to Biotic and Abiotic Stresses. *Brice Bourdenx, Amélie Bernard, Frédéric Domergue, Stéphanie Pascal, Amandine Léger, Dominique Roby, Marjorie Pervent, Denis Vile, Richard P. Haslam, Johnathan A. Napier, René Lessire, and Jérôme Joubès*

29

^[W]^[OA]The Transcriptional Regulator LEUNIG_HOMOLOG Regulates Mucilage Release from the Arabidopsis Testa. *Murray Walker, Muhammad Tehseen, Monika S. Doblin, Filomena A. Pettolino, Sarah M. Wilson, Antony Bacic, and John F. Golz*

46

^[W]^[OA]Functional Diversity of Isoamylase Oligomers: The ISA1 Homo-Oligomer Is Essential for Amylopectin Biosynthesis in Rice Endosperm. *Yoshinori Utsumi, Chikako Utsumi, Takayuki Sawada, Naoko Fujita, and Yasunori Nakamura*

61

^[W]^[OA]Wheat Grain Development Is Characterized by Remarkable Trehalose 6-Phosphate Accumulation Pregrain Filling: Tissue Distribution and Relationship to SNF1-Related Protein Kinase1 Activity. *Eleazar Martínez-Barajas, Thierry Delatte, Henriette Schlupepmann, Gerhardus J. de Jong, Govert W. Somsen, Cátia Nunes, Lucia F. Primavesi, Patricia Coello, Rowan A.C. Mitchell, and Matthew J. Paul*

373

Continued on next page

BIOENERGETICS AND PHOTOSYNTHESIS

- [W][OA] Identification of the UMP Synthase Gene by Establishment of Uracil Auxotrophic Mutants and the Phenotypic Complementation System in the Marine Diatom *Phaeodactylum tricornutum*. Toshiro Sakaguchi, Kensuke Nakajima, and Yusuke Matsuda 78
- [W][OA] The Mechanistic Basis of Internal Conductance: A Theoretical Analysis of Mesophyll Cell Photosynthesis and CO₂ Diffusion. Danny Tholen and Xin-Guang Zhu 90
- [C][OA] The Physiological Role of Ascorbate as Photosystem II Electron Donor: Protection against Photoinactivation in Heat-Stressed Leaves. Szilvia Z. Tóth, Valéria Nagy, Jos T. Puthur, László Kovács, and Győző Garab 382
- Lutein from Deepoxidation of Lutein Epoxide Replaces Zeaxanthin to Sustain an Enhanced Capacity for Nonphotochemical Chlorophyll Fluorescence Quenching in Avocado Shade Leaves in the Dark. Britta Förster, Barry James Pogson, and Charles Barry Osmond 393

CELL BIOLOGY AND SIGNAL TRANSDUCTION

- [C][W] Modulation of Abscisic Acid Signaling in Vivo by an Engineered Receptor-Insensitive Protein Phosphatase Type 2C Allele. Florine Dupeux, Regina Antoni, Katja Betz, Julia Santiago, Miguel Gonzalez-Guzman, Lesia Rodriguez, Silvia Rubio, Sang-Youl Park, Sean R. Cutler, Pedro L. Rodriguez, and José A. Márquez 106
- [W][OA] Functional Analyses of the Activation Loop of Phototropin2 in Arabidopsis. Shin-ichiro Inoue, Tomonao Matsushita, Yuta Tomokiyo, Masaki Matsumoto, Keiichi I. Nakayama, Toshinori Kinoshita, and Ken-ichiro Shimazaki 117
- [W][OA] Myosin XI-Dependent Formation of Tubular Structures from Endoplasmic Reticulum Isolated from Tobacco Cultured BY-2 Cells. Etsuo Yokota, Haruko Ueda, Kohsuke Hashimoto, Hidefumi Orii, Tomoo Shimada, Ikuko Hara-Nishimura, and Teruo Shimmen 129
- [C][W][OA] Auxin and Ethylene Induce Flavonol Accumulation through Distinct Transcriptional Networks. Daniel R. Lewis, Melissa V. Ramirez, Nathan D. Miller, Prashanthi Vallabhaneni, W. Keith Ray, Richard F. Helm, Brenda S.J. Winkel, and Gloria K. Muday 144
- [W][OA] Protein Phosphatase 2A B55 and A Regulatory Subunits Interact with Nitrate Reductase and Are Essential for Nitrate Reductase Activation. Behzad Heidari, Polina Matre, Dugassa Nemie-Feyissa, Christian Meyer, Odd Arne Rognli, Simon G. Møller, and Cathrine Lillo 165
- [W][OA] Reactive Oxygen Species and Nitric Oxide Mediate Actin Reorganization and Programmed Cell Death in the Self-Incompatibility Response of *Papaver*. Katie A. Wilkins, James Bancroft, Maurice Bosch, Jennifer Ings, Nicholas Smirnov, and Veronica E. Franklin-Tong 404
- [W][OA] Ethylene Receptor ETHYLENE RECEPTOR1 Domain Requirements for Ethylene Responses in Arabidopsis Seedlings. Heejung Kim, Elizabeth E. Helmbrecht, M. Blaine Stalans, Christina Schmitt, Nisha Patel, Chi-Kuang Wen, Wuyi Wang, and Brad M. Binder 417
- [W][OA] Involvement of Endogenous Abscisic Acid in Methyl Jasmonate-Induced Stomatal Closure in Arabidopsis. Mohammad Anowar Hossain, Shintaro Munemasa, Misugi Uraji, Yoshimasa Nakamura, Izumi C. Mori, and Yoshiyuki Murata 430

DEVELOPMENT AND HORMONE ACTION

- [C][W][OA] HISTONE DEACETYLASE6 Interacts with FLOWERING LOCUS D and Regulates Flowering in Arabidopsis. Chun-Wei Yu, Xuncheng Liu, Ming Luo, Chiayang Chen, Xiaodong Lin, Gang Tian, Qing Lu, Yuhai Cui, and Keqiang Wu 173
- [C][W][OA] A Negative Effector of Blue Light-Induced and Gravitropic Bending in Arabidopsis. Torsten Knauer, Michaela Dümmer, Frank Landgraf, and Christoph Forreiter 439

ENVIRONMENTAL STRESS AND ADAPTATION TO STRESS

- [C][W][OA] Organelles Contribute Differentially to Reactive Oxygen Species-Related Events during Extended Darkness. Shilo Rosenwasser, Ilona Rot, Evelyn Sollner, Andreas J. Meyer, Yoav Smith, Noam Leviatan, Robert Fluhr, and Haya Friedman 185
- [W][OA] The AP2/ERF Transcription Factor AtERF73/HRE1 Modulates Ethylene Responses during Hypoxia in Arabidopsis. Chin-Ying Yang, Fu-Chiun Hsu, Jin-Ping Li, Ning-Ning Wang, and Ming-Che Shih 202

Continued on next page

- [W][OA] Tomato RAV Transcription Factor Is a Pivotal Modulator Involved in the AP2/EREBP-Mediated Defense Pathway. Chia-Wen Li, Ruey-Chih Su, Chiu-Ping Cheng, Sanjaya, Su-Juan You, Tsai-Hung Hsieh, To-Chun Chao, and Ming-Tsair Chan 213
- [W][OA] COP1-Mediated Degradation of BBX22/LZF1 Optimizes Seedling Development in Arabidopsis. Chiung-Swey Joanne Chang, Julin N. Maloof, and Shu-Hsing Wu 228

GENETICS, GENOMICS, AND MOLECULAR EVOLUTION

- [W][OA] Phenotypic and Genomic Analyses of a Fast Neutron Mutant Population Resource in Soybean. Yung-Tsi Bolon, William J. Haun, Wayne W. Xu, David Grant, Minviluz G. Stacey, Rex T. Nelson, Daniel J. Gerhardt, Jeffrey A. Jeddelloh, Gary Stacey, Gary J. Muehlbauer, James H. Orf, Seth L. Naeve, Robert M. Stupar, and Carroll P. Vance 240
- [W][OA] Divergent Roles for the Two Poll-Like Organelle DNA Polymerases of Arabidopsis. Jean-Sébastien Parent, Etienne Lepage, and Normand Brisson 254
- [W][OA] Genetic Interaction of *OsMADS3*, *DROOPING LEAF*, and *OsMADS13* in Specifying Rice Floral Organ Identities and Meristem Determinacy. Haifeng Li, Wanqi Liang, Changsong Yin, Lu Zhu, and Dabing Zhang 263
- [C][W][OA] Distribution of *SUN*, *OVATE*, *LC*, and *FAS* in the Tomato Germplasm and the Relationship to Fruit Shape Diversity. Gustavo R. Rodríguez, Stéphane Muñoz, Claire Anderson, Sung-Chur Sim, Andrew Michel, Mathilde Causse, Brian B. McSpadden Gardener, David Francis, and Esther van der Knaap 275

PLANTS INTERACTING WITH OTHER ORGANISMS

- [W][OA] Arabidopsis NDR1 Is an Integrin-Like Protein with a Role in Fluid Loss and Plasma Membrane-Cell Wall Adhesion. Caleb Knepper, Elizabeth A. Savory, and Brad Day 286
- [W][OA] Differential Tomato Transcriptomic Responses Induced by Pepino Mosaic Virus Isolates with Differential Aggressiveness. Inge M. Hanssen, H. Peter van Esse, Ana-Rosa Ballester, Sander W. Hogewoning, Nelia Ortega Parra, Anneleen Paeleman, Bart Lievens, Arnaud G. Bovy, and Bart P.H.J. Thomma 301
- [W][OA] Gene Expression Profiling and Shared Promoter Motif for Cell Wall-Modifying Proteins Expressed in Soybean Cyst Nematode-Infected Roots. Mark L. Tucker, Charles A. Murphy, and Ronghui Yang 319

SYSTEMS BIOLOGY, MOLECULAR BIOLOGY, AND GENE REGULATION

- [W][OA] Silencing of Soybean Seed Storage Proteins Results in a Rebalanced Protein Composition Preserving Seed Protein Content without Major Collateral Changes in the Metabolome and Transcriptome. Monica A. Schmidt, W. Brad Barbazuk, Michael Sandford, Greg May, Zhihong Song, Wenxu Zhou, Basil J. Nikolau, and Eliot M. Herman 330
- [W][OA] Genome-Wide Analysis Reveals Gene Expression and Metabolic Network Dynamics during Embryo Development in Arabidopsis. Daoquan Xiang, Prakash Venglat, Chabane Tibiche, Hui Yang, Eddy Risseuw, Yongguo Cao, Vivijan Babic, Mathieu Cloutier, Wilf Keller, Edwin Wang, Gopalan Selvaraj, and Raju Datla 346
- [C][W][OA] Genomic Analysis of Circadian Clock-, Light-, and Growth-Related Genes Reveals PHYTOCHROME-INTERACTING FACTOR5 as a Modulator of Auxin Signaling in Arabidopsis. Kazunari Nozue, Stacey L. Harmer, and Julin N. Maloof 357

CORRECTIONS

- Mrt*, a Gene Unique to Fungi, Encodes an Oligosaccharide Transporter and Facilitates Rhizosphere Competency in *Metarhizium robertsii*. W. Fang and R.J. St. Leger 448

[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.