

The electronic form of this issue, available as of December 11, 2006, at www.plantphysiol.org, is considered the journal of record.

On the Cover: Cell-cell communication is essential for proper development and physiological function. To characterize genes that function to coordinate later leaf development, a screen was performed to identify mutants that develop sectors with reduced chloroplast pigmentation that violate cell lineage boundaries in maize leaves. In this issue, Braun et al. (pp. 1511–1522) characterize the *tie-dyed1* (*tdy1*) mutant that develops stable, nonclonal variegated leaf sectors. During sector formation, regions of leaf tissue hyperaccumulate photo-assimilates and subsequently undergo chlorosis, suggesting that TDY1 regulates carbohydrate partitioning. The cover picture shows the phenotype of *tdy1* in a genetic background in which anthocyanins accumulate exclusively in sectors with elevated carbohydrate levels. Cover photo by David Braun.

ON THE INSIDE

Peter V. Minorsky 1341

HIGH IMPACT

Regulation of Starch Metabolism in Arabidopsis Leaves. *Aleel K. Grennan* 1343

SCIENTIFIC CORRESPONDENCE

General and Analytic Solutions of the Ortega Equation. *Sylvia Lewicka* 1346

Extracellular γ -Aminobutyrate Mediates Communication between Plants and Other Organisms. *Barry J. Shelp, Alan W. Bown, and Denis Faure* 1350

RESEARCH ARTICLES

BIOCHEMICAL PROCESSES AND MACROMOLECULAR STRUCTURES

^[O^A]Interactions between *MUR10/CesA7*-Dependent Secondary Cellulose Biosynthesis and Primary Cell Wall Structure. *Sonia Bosca, Christopher J. Barton, Neil G. Taylor, Peter Ryden, Lutz Neumetzler, Markus Pauly, Keith Roberts, and Georg J. Seifert* 1353

^[W]Plant Glutathione Peroxidases Are Functional Peroxiredoxins Distributed in Several Subcellular Compartments and Regulated during Biotic and Abiotic Stresses. *Nicolas Navrot, Valérie Collin, José Gualberto, Eric Gelhaye, Masakazu Hirasawa, Pascal Rey, David B. Knaff, Emmanuelle Issakidis, Jean-Pierre Jacquot, and Nicolas Rouhier* 1364

^[W]Integrated Analysis of Metabolite and Transcript Levels Reveals the Metabolic Shifts That Underlie Tomato Fruit Development and Highlight Regulatory Aspects of Metabolic Network Behavior. *Fernando Carrari, Charles Baxter, Björn Usadel, Ewa Urbanczyk-Wochniak, Maria-Ines Zanor, Adriano Nunes-Nesi, Victoria Nikiforova, Danilo Centro, Antje Ratzka, Markus Pauly, Lee J. Sweetlove, and Alisdair R. Fernie* 1380

Continued on next page

BIOENERGETICS AND PHOTOSYNTHESIS

- A Eukaryotic Factor Required for Accumulation of the Chloroplast NAD(P)H Dehydrogenase Complex in Arabidopsis. *Ryohei Muraoka, Kenji Okuda, Yoshichika Kobayashi, and Toshiharu Shikanai* 1683

CELL BIOLOGY AND SIGNAL TRANSDUCTION

- ^[W]Exogenous Free Ubiquitin Enhances Lily Pollen Tube Adhesion to an in Vitro Stylar Matrix and May Facilitate Endocytosis of SCA. *Sun Tae Kim, Kangling Zhang, Juan Dong, and Elizabeth M. Lord* 1397
- Developmentally Controlled Farnesylation Modulates AtNAP1;1 Function in Cell Proliferation and Cell Expansion during Arabidopsis Leaf Development. *Arnaud Galichet and Wilhelm Gruissem* 1412
- Common Plantain. A Collection of Expressed Sequence Tags from Vascular Tissue and a Simple and Efficient Transformation Method. *Benjamin Pommerrenig, Inga Barth, Matthias Niedermeier, Sina Kopp, Jürg Schmid, Rex A. Dwyer, Racella J. McNair, Franz Klebl, and Norbert Sauer* 1427
- ^{[W][OA]}Dynamic Response of Prevacuolar Compartments to Brefeldin A in Plant Cells. *Yu Chung Tse, Sze Wan Lo, Stefan Hillmer, Paul Dupree, and Liwen Jiang* 1442
- NAD(P)H Oscillates in Pollen Tubes and Is Correlated with Tip Growth. *Luis Cárdenas, Sylvester T. McKenna, Joseph G. Kunkel, and Peter K. Hepler* 1460
- Molecular Interactions of Arabinogalactan Proteins with Cortical Microtubules and F-Actin in Bright Yellow-2 Tobacco Cultured Cells. *Harjinder Singh Sardar, Jie Yang, and Allan M. Showalter* 1469
- ^[W]Arabidopsis Reversibly Glycosylated Polypeptides 1 and 2 Are Essential for Pollen Development. *Georgia Drakakaki, Olga Zabolina, Ivan Delgado, Stéphanie Robert, Kenneth Keegstra, and Natasha Raikhel* 1480
- ^{[W][OA]}Ethylene Stimulates Nutations That Are Dependent on the ETR1 Receptor. *Brad M. Binder, Ronan C. O'Malley, Wuyi Wang, Tobias C. Zutz, and Anthony B. Bleecker* 1690

DEVELOPMENT AND HORMONE ACTION

- ^[W]Proteomic Analysis of Seed Dormancy in Arabidopsis. *Kamel Chibani, Sonia Ali-Rachedi, Claudette Job, Dominique Job, Marc Jullien, and Philippe Grappin* 1493
- ^{[C][W][OA]}*tie-dyed1* Regulates Carbohydrate Accumulation in Maize Leaves. *David M. Braun, Yi Ma, Noriko Inada, Michael G. Muszynski, and R. Frank Baker* 1511
- ^[W]*delayed flowering1* Encodes a Basic Leucine Zipper Protein That Mediates Floral Inductive Signals at the Shoot Apex in Maize. *Michael G. Muszynski, Thao Dam, Bailin Li, David M. Shirkbourn, Zhenglin Hou, Edward Bruggemann, Rayeann Archibald, Evgueni V. Ananiev, and Olga N. Danilevskaia* 1523

ENVIRONMENTAL STRESS AND ADAPTATION TO STRESS

- Physiological Characterization of Two Genes for Na⁺ Exclusion in Durum Wheat, *Nax1* and *Nax2*. *Richard A. James, Romola J. Davenport, and Rana Munns* 1537
- ^{[W][OA]}SIZ1 Small Ubiquitin-Like Modifier E3 Ligase Facilitates Basal Thermotolerance in Arabidopsis Independent of Salicylic Acid. *Chan Yul Yoo, Kenji Miura, Jing Bo Jin, Jiyoung Lee, Hyeong Cheol Park, David E. Salt, Dae-jin Yun, Ray A. Bressan, and Paul M. Hasegawa* 1548

Continued on next page

- EARLY RESPONSIVE TO DEHYDRATION 15, a Negative Regulator of Abscisic Acid Responses in Arabidopsis. Tarja Kariola, Günter Brader, Elina Helenius, Jing Li, Pekka Heino, and E. Tapio Palva 1559
- [W]Variation of Enzyme Activities and Metabolite Levels in 24 Arabidopsis Accessions Growing in Carbon-Limited Conditions. Joanna M. Cross, Maria von Korff, Thomas Altmann, Linda Bartzetko, Ronan Sulpice, Yves Gibon, Natalia Palacios, and Mark Stitt 1574
- [OA]Localization and Role of Manganese Superoxide Dismutase in a Marine Diatom. Felisa Wolfe-Simon, Valentin Starovoitov, John R. Reinfelder, Oscar Schofield, and Paul G. Falkowski 1701
- Nitrite Reduces Cytoplasmic Acidosis under Anoxia. I.G.L. Libourel, P.M. van Bodegom, M.D. Fricker, and R.G. Ratcliffe 1710

GENETICS, GENOMICS, AND MOLECULAR EVOLUTION

- [W]Large-Scale cis-Element Detection by Analysis of Correlated Expression and Sequence Conservation between Arabidopsis and Brassica oleracea. Georg Haberer, Michael T. Mader, Peter Kosarev, Manuel Spannagl, Li Yang, and Klaus F.X. Mayer 1589
- [W][OA]A Sodium Transporter (HKT7) Is a Candidate for Nax1, a Gene for Salt Tolerance in Durum Wheat. Shaobai Huang, Wolfgang Spielmeyer, Evans S. Lagudah, Richard A. James, J. Damien Platten, Elizabeth S. Dennis, and Rana Munns 1718
- [W][OA]FRIGIDA LIKE 2 Is a Functional Allele in Landsberg erecta and Compensates for a Nonsense Allele of FRIGIDA LIKE 1. Michael R. Schläppi 1728

PLANTS INTERACTING WITH OTHER ORGANISMS

- [W][OA]Modifications to the Arabidopsis Defense Proteome Occur Prior to Significant Transcriptional Change in Response to Inoculation with Pseudomonas syringae. Alexandra M.E. Jones, Vincent Thomas, Mark H. Bennett, John Mansfield, and Murray Grant 1603
- [W]Molecular Interactions between the Specialist Herbivore Manduca sexta (Lepidoptera, Sphingidae) and Its Natural Host Nicotiana attenuata. VII. Changes in the Plant's Proteome. Ashok P. Giri, Hendrik Wiünsche, Sirsha Mitra, Jorge A. Zavala, Alexander Muck, Aleš Svatoš, and Ian T. Baldwin 1621
- Geminivirus Infection Up-Regulates the Expression of Two Arabidopsis Protein Kinases Related to Yeast SNF1- and Mammalian AMPK-Activating Kinases. Wei Shen and Linda Hanley-Bowdoin 1642
- [C][W]Lotus japonicus Nodulation Requires Two GRAS Domain Regulators, One of Which Is Functionally Conserved in a Non-Legume. Anne B. Heckmann, Fabien Lombardo, Hiroki Miwa, Jillian A. Perry, Sue Bunnewell, Martin Parniske, Trevor L. Wang, and J. Allan Downie 1739
- [W]Systemin in Solanum nigrum. The Tomato-Homologous Polypeptide Does Not Mediate Direct Defense Responses. Silvia Schmidt and Ian T. Baldwin 1751

SYSTEMS BIOLOGY, MOLECULAR BIOLOGY, AND GENE REGULATION

- [W]Arabidopsis Orthologs of Maize Chloroplast Splicing Factors Promote Splicing of Orthologous and Species-Specific Group II Introns. Yukari Asakura and Alice Barkan 1656

Continued from preceding page

^[C]Heterologous Expression and Molecular and Cellular Characterization of *CaPUB1* Encoding a Hot Pepper U-Box E3 Ubiquitin Ligase Homolog. *Seok Keun Cho, Hoo Sun Chung, Moon Young Ryu, Mi Jin Park, Myeong Min Lee, Young-Yil Bahk, Jungmook Kim, Hyun Sook Pai, and Woo Taek Kim* 1664

^[W]^[OA]Nuclear Magnetic Resonance Spectroscopy-Based Metabolite Profiling of Transgenic Tomato Fruit Engineered to Accumulate Spermidine and Spermine Reveals Enhanced Anabolic and Nitrogen-Carbon Interactions. *Autar K. Mattoo, Anatoli P. Sobolev, Anil Neelam, Ravinder K. Goyal, Avtar K. Handa, and Anna L. Segre* 1759

CORRECTIONS

Quantification of Compartmented Metabolic Fluxes in Developing Soybean Embryos by Employing Biosynthetically Directed Fractional ¹³C Labeling, Two-Dimensional [¹³C,¹H] Nuclear Magnetic Resonance, and Comprehensive Isotopomer Balancing. *G. Sriram, D.B. Fulton, V.V. Iyer, J.M. Peterson, R. Zhou, M.E. Westgate, M.H. Spalding, and J.V. Shanks* 1771

Surface Position, Not Signaling from Surrounding Maternal Tissues, Specifies Aleurone Epidermal Cell Fate in Maize. *D. Gruis, H. Guo, D. Selinger, Q. Tian, and O.-A. Olsen* 1771

^[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.