

T H E
PLANT
C E L L

Volume 26 Number 10 October 2014

The electronic form of this issue, available at www.plantcell.org, is the journal of record.

ON THE COVER



Molecular mechanisms regulating dormancy in overwintering buds (OWBs) in herbaceous perennials such as gentian (*Gentiana*) are unclear. Takahashi et al. (pages 3949–3963) conducted targeted metabolome analysis to obtain clues about the metabolic mechanisms involved in regulating OWB dormancy. The results show that the oligosaccharide gentiobiose accumulates prior to budbreak and acts as a signal for dormancy release of gentian through the ascorbate-GSH pathway. The cover shows *Gentiana triflora* cv Iwate Yumeaio, cultivated from a wild gentian species native to higher elevation meadows, forests, hills, and mountains of China, Mongolia, Eastern Russia, Korea, and Japan.

IN BRIEF

- Bitter Taste of Winter: Gentiobiose Regulates Overwintering Bud Dormancy in *Gentiana*** 3825
Jennifer Lockhart
- How ELONGATED HYPOCOTYL5 Helps Protect Plants from UV-B Rays** 3826
Jennifer Lockhart
- Lipids in Leaves: Fatty Acid β -Oxidation Affects Lipid Homeostasis** 3827
Jennifer Mach
- Simultaneous Monitoring of Leaf Growth and Leaf Movement** 3828
Nancy R. Hofmann

COMMENTARY

- Reliable Gene Expression Analysis by Reverse Transcription-Quantitative PCR: Reporting and Minimizing the Uncertainty in Data Accuracy** [W|OPEN](#) 3829
Tony Remans, Els Keunen, Geert Jan Bex, Karen Smeets, Jaco Vangronsveld, and Ann Cuypers
- Robust Self-Incompatibility in the Absence of a Functional *ARC1* Gene in *Arabidopsis thaliana*** 3838
June B. Nasrallah and Mikhail E. Nasrallah
- The *ARC1* E3 Ligase Promotes a Strong and Stable Self-Incompatibility Response in *Arabidopsis* Species: Response to the Nasrallah and Nasrallah Commentary** [OPEN](#) 3842
Daphne R. Goring, Emily Indriolo, and Marcus A. Samuel

REVIEW

- Plant Metabolic Modeling: Achieving New Insight into Metabolism and Metabolic Engineering** 3847
Kambiz Baghalian, Mohammad-Reza Hajirezaei, and Falk Schreiber

LARGE-SCALE BIOLOGY ARTICLES

- A Proteomic Strategy for Global Analysis of Plant Protein Complexes** [W|OPEN](#) 3867
Uma K. Aryal, Yi Xiong, Zachary McBride, Daisuke Kihara, Jun Xie, Mark C. Hall, and Daniel B. Szymanski

EDITORIAL BOARD

Editor in Chief

Cathie Martin

Cooditors

Sarah M. Assmann

Jody Banks

Alice Barkan

Sebastian Bednarek

James Birchler

Ulla Bonas

Christopher Bowler

Judy Callis

XiaoFeng Cao

Vincenzo De Luca

Xing Wang Deng

Xinnian Dong

Allan Downie

Alisdair Fernie

Pascal Genschik

Jean T. Greenberg

Thomas Guilfoyle

Herman R. Höfte

David Jackson

Regine Kahmann

Martin Kater

Daniel J. Kliebenstein

William Lucas

Blake Meyers

Ortrun Mittelsten Scheid

Giles Oldroyd

Michael Palmgren

Markus Pauly

Scott C. Peck

Barry Pogson

Zhaohui Qin

Karin Schumacher

David Smyth

Chris J. Staiger

Keiko Sugimoto

Managing Editor

Patti Lockhart

Senior Features Editor

Nancy A. Eckardt

Features Editor

Mary Williams

Science Editors

Greg Bertoni

Kathleen L. Farquharson

Nancy R. Hofmann

Jennifer Lockhart

Jennifer M. Mach

Production Manager

Susan L. Entwistle

Manuscript Manager

Annette Kessler

Publications Director

Nancy A. Winchester

Publisher

American Society of

Plant Biologists

Executive Director,

Crispin Taylor

Editorial Office

15501 Monona Drive

Rockville, Maryland 20855-2768

Telephone: 301/296-0908

Fax: 301/279-2996

http://www.aspb.org

Online at www.plantcell.org

Differential Nuclease Sensitivity Profiling of Chromatin Reveals Biochemical Footprints Coupled to Gene Expression and Functional DNA Elements in Maize [W|OPEN](#) 3883

Daniel L. Vera, Thelma F. Madzima, Jonathan D. Labonne, Mohammad P. Alam, Gregg G. Hoffman, S.B. Girimurugan, Jinfeng Zhang, Karen M. McGinnis, Jonathan H. Dennis, and Hank W. Bass

A Functional and Evolutionary Perspective on Transcription Factor Binding in *Arabidopsis thaliana* [C|W](#) 3894

Ken S. Heyndrickx, Jan Van de Velde, Congmao Wang, Detlef Weigel, and Klaas Vandepoele

Differentially Phased Leaf Growth and Movements in *Arabidopsis* Depend on Coordinated Circadian and Light Regulation [W](#) 3911

Tino Dornbusch, Olivier Michaud, Ioannis Xenarios, and Christian Fankhauser

RESEARCH ARTICLES

Chromatin-Dependent Repression of the *Arabidopsis* Floral Integrator Genes Involves Plant Specific PHD-Containing Proteins [C|W](#) 3922

Leticia López-González, Alfonso Mouriz, Laura Narro-Diego, Regla Bustos, José Miguel Martínez-Zapater, Jose A. Jarillo, and Manuel Piñeiro

Nonsyntenic Genes Drive Highly Dynamic Complementation of Gene Expression in Maize Hybrids [W](#) 3939

Anja Paschold, Nick B. Larson, Caroline Marcon, James C. Schnable, Cheng-Ting Yeh, Christa Lanz, Dan Nettleton, Hans-Peter Piepho, Patrick S. Schnable, and Frank Hochholdinger

The Gentio-Oligosaccharide Gentiobiose Functions in the Modulation of Bud Dormancy in the Herbaceous Perennial *Gentiana* [C|W](#) 3949

Hideyuki Takahashi, Tomohiro Imamura, Naotake Konno, Takumi Takeda, Kohei Fujita, Teruko Konishi, Masahiro Nishihara, and Hirofumi Uchimiya

Jasmonoyl-L-Isoleucine Coordinates Metabolic Networks Required for Anthesis and Floral Attractant Emission in Wild Tobacco (*Nicotiana attenuata*) [C|W|OPEN](#) 3964

Michael Stitz, Markus Hartl, Ian T. Baldwin, and Emmanuel Gaquerel

The *Arabidopsis* Ethylene/Jasmonic Acid-NRT Signaling Module Coordinates Nitrate Reallocation and the Trade-Off between Growth and Environmental Adaptation [W|OPEN](#) 3984

Guo-Bin Zhang, Hong-Ying Yi, and Ji-Ming Gong

Evening Expression of *Arabidopsis GIGANTEA* Is Controlled by Combinatorial Interactions among Evolutionarily Conserved Regulatory Motifs [C|W|OPEN](#) 3999

Markus C. Berns, Karl Nordström, Frédéric Cremer, Réka Tóth, Martin Hartke, Samson Simon, Jonas R. Klasen, Ingmar Bürtzel, and George Coupland

A Microbial Avenue to Cell Cycle Control in the Plant Superkingdom [C|W|OPEN](#) 4019

Frej Tulin and Frederick R. Cross

FAMA Is an Essential Component for the Differentiation of Two Distinct Cell Types, Myrosin Cells and Guard Cells, in *Arabidopsis* [W](#) 4039

Makoto Shirakawa, Haruko Ueda, Atsushi J. Nagano, Tomoo Shimada, Takayuki Kohchi, and Ikuko Hara-Nishimura

Myrosin Idioblast Cell Fate and Development Are Regulated by the *Arabidopsis* Transcription Factor FAMA, the Auxin Pathway, and Vesicular Trafficking [W](#) 4053

Meng Li and Fred D. Sack

Arabidopsis TTG2 Regulates *TRY* Expression through Enhancement of Activator Complex-Triggered Activation [C|W](#) 4067

Martina Pesch, Burcu Dartan, Rainer Birkenbihl, Imre E. Somssich, and Martin Hülskamp

Arabidopsis ATG8-INTERACTING PROTEIN1 Is Involved in Autophagy-Dependent Vesicular Trafficking of Plastid Proteins to the Vacuole [W|OPEN](#) 4084

Simon Michaeli, Arik Honig, Hanna Levanony, Hadas Peled-Zehavi, and Gad Galili

Trans-Golgi Network-Located AP1 Gamma Adaptins Mediate Dilucine Motif-Directed Vacuolar Targeting in *Arabidopsis* [C](#)[W](#) 4102

Xiangfeng Wang, Yi Cai, Hao Wang, Yonglun Zeng, Xiaohong Zhuang, Baiying Li, and Liwen Jiang

***Arabidopsis* Lipins, PDAT1 Acyltransferase, and SDP1 Triacylglycerol Lipase Synergistically Direct Fatty Acids toward β -Oxidation, Thereby Maintaining Membrane Lipid Homeostasis** [C](#)[W](#) 4119

Jilian Fan, Chengshi Yan, Rebecca Roston, John Shanklin, and Changcheng Xu

Quantitative Peptidomics Study Reveals That a Wound-Induced Peptide from PR-1 Regulates Immune Signaling in Tomato [W](#)[OPEN](#) 4135

Ying-Lan Chen, Chi-Ying Lee, Kai-Tan Cheng, Wei-Hung Chang, Rong-Nan Huang, Hong Gil Nam, and Yet-Ran Chen

CYCLIN-DEPENDENT KINASE8 Differentially Regulates Plant Immunity to Fungal Pathogens through Kinase-Dependent and -Independent Functions in *Arabidopsis* [C](#)[W](#) 4149

Yingfang Zhu, Craig M. Schluttenhoffer, Pengcheng Wang, Fuyou Fu, Jyothi Thimmapuram, Jian-Kang Zhu, Sang Yeol Lee, Dae-Jin Yun, and Tesfaye Mengiste

Salicylic Acid Regulates *Arabidopsis* Microbial Pattern Receptor Kinase Levels and Signaling [W](#)[OPEN](#) 4171

Chika Tateda, Zhongqin Zhang, Jay Shrestha, Joanna Jelenska, Delphine Chinchilla, and Jean T. Greenberg

Nod Factor Receptors Form Heteromeric Complexes and Are Essential for Intracellular Infection in *Medicago* Nodules [W](#) 4188

Sjef Moling, Anna Pietraszewska-Bogiel, Marten Postma, Elena Fedorova, Mark A. Hink, Erik Limpens, Theodorus W.J. Gadella, and Ton Bisseling

UV-B-Responsive Association of the *Arabidopsis* bZIP Transcription Factor ELONGATED HYPOCOTYL5 with Target Genes, Including Its Own Promoter [W](#)[OPEN](#) 4200

Melanie Binkert, László Kozma-Bognár, Kata Terecskei, Lieven De Veylder, Ferenc Nagy, and Roman Ulm

Critical Function of a *Chlamydomonas reinhardtii* Putative Polyphosphate Polymerase Subunit during Nutrient Deprivation [C](#)[W](#) 4214

Munevver Aksoy, Wirulda Pootakham, and Arthur R. Grossman

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

[W](#) Online version contains Web-only data.

[OPEN](#) Articles can be viewed online without a subscription.



© 2014 American Society of Plant Biologists. All rights reserved. Printed on acid-free paper effective with Volume 1, Number 1, January 1989. Printed in the United States of America.

The Plant Cell (ISSN 1040-4651, online ISSN 1532-298X) is published monthly (one volume per year) by the American Society of Plant Biologists, 15501 Monona Drive, Rockville, MD 20855-2768, and is produced by Dartmouth Journal Services, Waterbury, VT. The institutional price for the print and online versions is based on type of institution; contact institution@aspb.org. Single copies may be purchased for \$40 each, plus \$10 shipping (U.S.) or \$12 (outside U.S.). Members of the American Society of Plant Biologists may subscribe to *The Plant Cell* for \$240. Nonmember individuals may subscribe for \$500. Students may subscribe for \$165. For matters regarding subscriptions, contact Suzanne Cholwek, ASPB, 15501 Monona Drive, Rockville, MD 20855-2768; telephone 301/296-0926; fax 301/251-6740; e-mail scholwek@aspb.org. Notify ASPB in writing within 3 months (domestic) or 6 months (foreign) of issue date, and defective copies or copies lost in the mail will be replaced. Send all inquiries regarding display advertising to FASEB AdNet, 9650 Rockville Pike, Bethesda, MD 20814-3998; telephone 301/634-7791; fax 301/634-7153; e-mail adnet@faseb.org. Periodicals postage paid at Rockville, MD 20850, and at additional mailing offices.

Postmaster: Send address changes to *The Plant Cell*, American Society of Plant Biologists, 15501 Monona Drive, Rockville, MD 20855-2768. The online version of *The Plant Cell* is available at www.plantcell.org.

Permission to Reprint: Permission to make digital or hard copies of part or all of a work published in *The Plant Cell* is granted without fee for personal or classroom use provided that copies are not made or distributed for profit or commercial advantage and that copies bear the full citation and the following notice on the first page: "Copyright American Society of Plant Biologists." For all other kinds of copying, request permission in writing from Nancy A. Winchester, Publications Director, ASPB headquarters.

This information is current as of April 22, 2019

Permissions	https://www.copyright.com/ccc/openurl.do?sid=pd_hw1532298X&issn=1532298X&WT.mc_id=pd_hw1532298X
eTOCs	Sign up for eTOCs at: http://www.plantcell.org/cgi/alerts/ctmain
CiteTrack Alerts	Sign up for CiteTrack Alerts at: http://www.plantcell.org/cgi/alerts/ctmain
Subscription Information	Subscription Information for <i>The Plant Cell</i> and <i>Plant Physiology</i> is available at: http://www.aspb.org/publications/subscriptions.cfm