

VOLUME 26

NUMBER 8

AUGUST 2014

T H E
PLANT
C E L L



A ROLE FOR ARK1 IN MICROTUBULE DYNAMICS

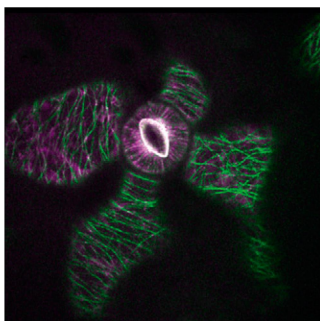
www.plantcell.org

T H E
PLANT
C E L L

Volume 26 Number 8 August 2014

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

ON THE COVER



Eng and Wasteneys (pages 3372–3386) study microtubule dynamics and show that *Arabidopsis thaliana* ARMADILLO-REPEAT KINESIN1 (ARK1) plays a key role in root hair tip growth by promoting microtubule catastrophe events. This destabilizing activity appears to maintain adequate free tubulin concentrations in order to permit rapid microtubule growth, which in turn is correlated with uniform tip growth. The cover image shows a confocal micrograph of *Arabidopsis* cotyledon pavement and guard cells expressing 35Spro:mCherry-MAP4MBD (green) and ARK1pro:ARK1-GFP (purple). ARK1-GFP is asymmetrically distributed on the growing plus ends of microtubules where it promotes the disassembly of microtubules.

IN BRIEF

Never Let a Good Crisis Go to Waste: The Kinesin ARK1 Promotes Microtubule Catastrophe during Root Hair Development 3221

Jennifer Lockhart

Modeling Sugar Metabolism in Tomato Fruit 3222

Jennifer Mach

LARGE-SCALE BIOLOGY ARTICLE

Model-Assisted Analysis of Sugar Metabolism throughout Tomato Fruit Development Reveals Enzyme and Carrier Properties in Relation to Vacuole Expansion [W](#) 3224

Bertrand P. Beauvoit, Sophie Colombié, Antoine Monier, Marie-Hélène Andrieu, Benoit Biais, Camille Bénard, Catherine Chéniclet, Martine Dieuaide-Noubhani, Christine Nazaret, Jean-Pierre Mazat, and Yves Gibon

RESEARCH ARTICLES

Comparative Transcriptome Atlases Reveal Altered Gene Expression Modules between Two Cleomaceae C₃ and C₄ Plant Species [C](#)[W](#)[I](#)[O](#)[P](#)[E](#)[N](#) 3243

Canan Külahoglu, Alisandra K. Denton, Manuel Sommer, Janina MaP, Simon Schliesky, Thomas J. Wrobel, Barbara Berckmans, Elsa Gongora-Castillo, C. Robin Buell, Rüdiger Simon, Lieven De Veylder, Andrea Bräutigam, and Andreas P.M. Weber

eQTL Mapping of Transposon Silencing Reveals a Position-Dependent Stable Escape from Epigenetic Silencing and Transposition of *AtMu1* in the *Arabidopsis* Lineage [C](#)[W](#) 3261

Tina Kabelitz, Christian Kappel, Kirstin Henneberger, Eileen Benke, Christiane Nöh, and Isabel Bäurle

Analysis of Natural and Induced Variation in Tomato Glandular Trichome Flavonoids Identifies a Gene Not Present in the Reference Genome [W](#)[I](#)[O](#)[P](#)[E](#)[N](#) 3272

Jeongwoon Kim, Yuki Matsuba, Jing Ning, Anthony L. Schillmiller, Dagan Hammar, A. Daniel Jones, Eran Pichersky, and Robert L. Last

Production of Bioactive Diterpenoids in the Euphorbiaceae Depends on Evolutionarily Conserved Gene Clusters [C](#)[W](#)[I](#)[O](#)[P](#)[E](#)[N](#) 3286

Andrew J. King, Geoffrey D. Brown, Alison D. Gilday, Tony R. Larson, and Ian A. Graham

EDITORIAL BOARD

Editor in Chief

Cathie Martin

Coeditors

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

- Pollen-Specific Activation of *Arabidopsis* Retrogenes Is Associated with Global Transcriptional Reprogramming** [W|OPEN](#) 3299
Ahmed Abdelsamad and Ales Pecinka
- Identification of a Sphingolipid α -Glucuronosyltransferase That Is Essential for Pollen Function in *Arabidopsis*** [C|W|OPEN](#) 3314
Emilie A. Rennie, Berit Ebert, Godfrey P. Miles, Rebecca E. Cahoon, Katy M. Christiansen, Solomon Stonebloom, Hoda Khatab, David Twell, Christopher J. Petzold, Paul D. Adams, Paul Dupree, Joshua L. Heazlewood, Edgar B. Cahoon, and Henrik Vibe Scheller
- The *Arabidopsis* 14-3-3 Protein RARE COLD INDUCIBLE 1A Links Low-Temperature Response and Ethylene Biosynthesis to Regulate Freezing Tolerance and Cold Acclimation** [C|W](#) 3326
Rafael Catalá, Rosa López-Cobollo, M. Mar Castellano, Trinidad Angosto, José M. Alonso, Joseph R. Ecker, and Julio Salinas
- A Mitogen-Activated Protein Kinase Cascade Module, MKK3-MPK6 and MYC2, Is Involved in Blue Light-Mediated Seedling Development in *Arabidopsis*** [C|W](#) 3343
Vishmita Sethi, Badmi Raghuram, Alok Krishna Sinha, and Sudip Chattopadhyay
- Manipulation of Mitogen-Activated Protein Kinase Kinase Signaling in the *Arabidopsis* Stomatal Lineage Reveals Motifs That Contribute to Protein Localization and Signaling Specificity** [W|OPEN](#) 3358
Gregory R. Lampard, Diego L. Wengier, and Dominique C. Bergmann
- The Microtubule Plus-End Tracking Protein ARMADILLO-REPEAT KINESIN1 Promotes Microtubule Catastrophe in *Arabidopsis*** [W|OPEN](#) 3372
Ryan Christopher Eng and Geoffrey O. Wasteneys
- The Os-AKT1 Channel Is Critical for K⁺ Uptake in Rice Roots and Is Modulated by the Rice CBL1-CIPK23 Complex** [W|OPEN](#) 3387
Juan Li, Yu Long, Guo-Ning Qi, Juan Li, Zi-Jian Xu, Wei-Hua Wu, and Yi Wang
- The ABC Transporter ABCG1 Is Required for Suberin Formation in Potato Tuber Periderm** [W](#) 3403
Ramona Landgraf, Ulrike Smolka, Simone Altmann, Lennart Eschen-Lippold, Melanie Senning, Sophia Sonnewald, Benjamin Weigel, Nadezhda Frolova, Nadine Strehmel, Gerd Hause, Dierk Scheel, Christoph Böttcher, and Sabine Rosahl
- Dynamics of Vacuoles and H⁺-Pyrophosphatase Visualized by Monomeric Green Fluorescent Protein in *Arabidopsis*: Artifactual Bulbs and Native Intravacuolar Spherical Structures** [W|OPEN](#) 3416
Shoji Segami, Sachi Makino, Ai Miyake, Mariko Asaoka, and Masayoshi Maeshima
- Functional Characterization of the Small Regulatory Subunit PetP from the Cytochrome *b₆f* Complex in *Thermosynechococcus elongatus*** [C|W](#) 3435
Sascha Rexroth, Dorothea Rexroth, Sebastian Veit, Nicole Plohnke, Kai U. Cormann, Marc M. Nowaczyk, and Matthias Rögner

Fang-Cheng Bi, Zhe Liu, Jian-Xin Wu, Hua Liang, Xue-Li Xi, Ce Fang, Tie-Jun Sun, Jian Yin, Guang-Yi Dai, Chan Rong, Jean T. Greenberg, Wei-Wei Su, and Nan Yao

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

 Online version contains Web-only data.

 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.