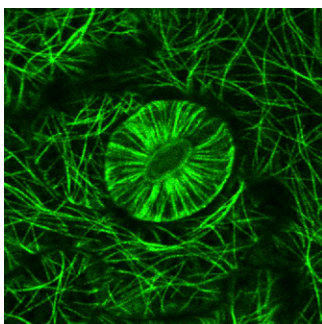


T H E
PLANT
C E L L

Volume 22 Number 1 January 2010

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

ON THE COVER



The γ -tubulin complex, which is critical for microtubule (MT) nucleation and organization in eukaryotic cells, comprises six γ -tubulin complex proteins (GCPs), with γ -tubulin itself being GCP1. The function of the other GCPs is well-described in animal and fungal cells but not well understood in plant cells. Kong et al. (pages 191–204) show that GCP4 is an indispensable component for the function of γ -tubulin in MT nucleation and organization in plant cells. The cover image shows MT highlighted by a green fluorescent protein-tubulin fusion protein expressed in leaf epidermal cells in *Arabidopsis*. The paired guard cells in the center exhibit radiating MT arrays, whereas the cortical MTs form complex networks in the surrounding pavement cells.

IN BRIEF

- Physcomitrella* Reveals a Key Role for Stromal Hsp70 Chaperones in Chloroplast Protein Import** 1
Nancy A. Eckardt
- Retrotransposon Domain Swapping** 2
Jennifer Mach
- A Double Lock on Polyploidy-Associated Epigenetic Gene Silencing** 3
Nancy A. Eckardt

REVIEW

- Evolutionary Studies Illuminate the Structural-Functional Model of Plant Phytochromes** [W](#) 4
Sarah Mathews

RESEARCH ARTICLES

- Global Epigenetic and Transcriptional Trends among Two Rice Subspecies and Their Reciprocal Hybrids** [W](#) 17
Guangming He, Xiaopeng Zhu, Axel A. Elling, Liangbi Chen, Xiangfeng Wang, Lan Guo, Manzhong Liang, Hang He, Huiyong Zhang, Fangfang Chen, Yijun Qi, Runsheng Chen, and Xing-Wang Deng
- Cooperation of Multiple Chromatin Modifications Can Generate Unanticipated Stability of Epigenetic States in *Arabidopsis*** [C](#) [W](#) [OA](#) 34
Tuncay Baubec, Huy Q. Dinh, Ales Pecinka, Branislava Rakic, Wilfried Rozhon, Bonnie Wohlrab, Arndt von Haeseler, and Ortrun Mittelsten Scheid
- Bifurcation and Enhancement of Autonomous-Nonautonomous Retrotransposon Partnership through LTR Swapping in Soybean** [C](#) [W](#) 48
Jianchang Du, Zhixi Tian, Nathan J. Bowen, Jeremy Schmutz, Randy C. Shoemaker, and Jianxin Ma
- BLADE-ON-PETIOLE1 Coordinates Organ Determinacy and Axial Polarity in *Arabidopsis* by Directly Activating ASYMMETRIC LEAVES2** [C](#) [W](#) 62
Ji Hyung Jun, Chan Man Ha, and Jennifer C. Fletcher
- The Plastid Isoform of Triose Phosphate Isomerase Is Required for the Postgerminative Transition from Heterotrophic to Autotrophic Growth in *Arabidopsis*** [W](#) 77
Mingjie Chen and Jay J. Thelen

EDITORIAL BOARD

Editor in Chief

Cathie Martin

Coeditors

Sarah M. Assmann
Jody Banks
Alice Barkan
Kathy Barton
David Baum
Sebastian Bednarek
James Birchler
Ulla Bonas
Christopher Bowler
Judy Callis
XiaoFeng Cao
Nigel Crawford
Vincenzo De Luca
Xing Wang Deng
Xinnian Dong
Allan Downie
Alisdair Fernie
Pascal Genschik
Jean T. Greenberg
Thomas Guilfoyle
David Jackson
Martin Kater
Patricia Leon
Clive Lloyd
William Lucas
Blake Meyers
Joseph Noel
Michael Palmgren
Markus Pauly
Scott C. Peck
Barry Pogson
David Smyth
Chris J. Staiger
Keiko Sugimoto
Nicholas J. Talbot

Managing Editor

John Long

Senior Features Editor

Nancy A. Eckardt

Features Editor

Mary Williams

Science Editors

Greg Bertoni
Kathleen L. Farquharson
Nancy R. Hofmann
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

- The ABORTED MICROSPORES Regulatory Network Is Required for Postmeiotic Male Reproductive Development in *Arabidopsis thaliana*** [W](#) [O](#) [A](#) 91
Jie Xu, Caiyun Yang, Zheng Yuan, Dasheng Zhang, Martha Y. Gondwe, Zhiwen Ding, Wanqi Liang, Dabing Zhang, and Zoe A. Wilson
- Arabidopsis* CULLIN4-Damaged DNA Binding Protein 1 Interacts with CONSTITUTIVELY PHOTOMORPHOGENIC1-SUPPRESSOR OF PHYA Complexes to Regulate Photomorphogenesis and Flowering Time** [C](#) [W](#) 108
Haodong Chen, Xi Huang, Giuliana Gusmaroli, William Terzaghi, On Sun Lau, Yuki Yanagawa, Yu Zhang, Jigang Li, Jae-Hoon Lee, Danmeng Zhu, and Xing Wang Deng
- The RAD23 Family Provides an Essential Connection between the 26S Proteasome and Ubiquitylated Proteins in *Arabidopsis*** [W](#) 124
Lisa M. Farmer, Adam J. Book, Kwang-Hee Lee, Ya-Ling Lin, Hongyong Fu, and Richard D. Vierstra
- Auxin-Mediated Ribosomal Biogenesis Regulates Vacuolar Trafficking in *Arabidopsis*** [W](#) 143
Abel Rosado, Eun Ju Sohn, Georgia Drakakaki, Songqin Pan, Alexandra Swidergal, Yuqing Xiong, Byung-Ho Kang, Ray A. Bressan, and Natasha V. Raikhel
- Loss-of-Function Mutations of Retromer Large Subunit Genes Suppress the Phenotype of an *Arabidopsis zig* Mutant That Lacks Qb-SNARE VTI11** [C](#) [W](#) 159
Yasuko Hashiguchi, Mitsuru Niihama, Tetsuya Takahashi, Chieko Saito, Akihiko Nakano, Masao Tasaka, and Miyo Terao Morita
- Cytochrome P450 Family Member CYP704B2 Catalyzes the ω -Hydroxylation of Fatty Acids and Is Required for Anther Cutin Biosynthesis and Pollen Exine Formation in Rice** [W](#) [O](#) [A](#) 173
Hui Li, Franck Pinot, Vincent Sauveplane, Danièle Werck-Reichhart, Patrik Diehl, Lukas Schreiber, Rochus Franke, Ping Zhang, Liang Chen, Yawei Gao, Wanqi Liang, and Dabing Zhang
- The γ -Tubulin Complex Protein GCP4 Is Required for Organizing Functional Microtubule Arrays in *Arabidopsis thaliana*** [W](#) 191
Zhaosheng Kong, Takashi Hotta, Yuh-Ru Julie Lee, Tetsuya Horio, and Bo Liu
- A Stromal Heat Shock Protein 70 System Functions in Protein Import into Chloroplasts in the Moss *Physcomitrella patens*** [C](#) [W](#) [O](#) [A](#) 205
Lan-Xin Shi and Steven M. Theg
- An *Arabidopsis* Mutant with High Cyclic Electron Flow around Photosystem I (*hcef*) Involving the NADPH Dehydrogenase Complex** [W](#) [O](#) [A](#) 221
Aaron K. Livingston, Jeffrey A. Cruz, Kaori Kohzuma, Amit Dhingra, and David M. Kramer
- MRL1, a Conserved Pentatricopeptide Repeat Protein, Is Required for Stabilization of *rbcl* mRNA in *Chlamydomonas* and *Arabidopsis*** [C](#) [W](#) 234
Xenie Johnson, Katia Wostrikoff, Giovanni Finazzi, Richard Kuras, Christian Schwarz, Sandrine Bujaldon, Joerg Nickelsen, David B. Stern, Francis-André Wollman, and Olivier Vallon
- The *Arabidopsis* Prohibitin Gene *PHB3* Functions in Nitric Oxide-Mediated Responses and in Hydrogen Peroxide-Induced Nitric Oxide Accumulation** [C](#) [W](#) 249
Yong Wang, Amber Ries, Kati Wu, Albert Yang, and Nigel M. Crawford
- Tomato 14-3-3 Protein 7 Positively Regulates Immunity-Associated Programmed Cell Death by Enhancing Protein Abundance and Signaling Ability of MAPKKK α** [C](#) [W](#) 260
Chang-Sik Oh, Kerry F. Pedley, and Gregory B. Martin

Jasmonate and ppHsystemin Regulate Key Malonylation Steps in the Biosynthesis of 17-Hydroxygeranylinalool Diterpene Glycosides, an Abundant and Effective Direct Defense against Herbivores in *Nicotiana attenuata*

273

Sven Heiling, Meredith C. Schuman, Matthias Schoettner, Purba Mukerjee, Beatrice Berger, Bernd Schneider, Amir R. Jassbi, and Ian T. Baldwin

☐ 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.

☐ Open Access articles can be viewed online without a subscription.



© 2010 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 1531-298X) 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. A subscription includes both *The Plant Cell* and *Plant Physiology*; single copies may be purchased for \$95 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 \$185. Nonmember individuals may subscribe for \$375. 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 September 30, 2020

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