

T H E
PLANT
C E L L

Volume 31 Number 9 September 2019

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

ON THE COVER



In many plant leaves, starch is synthesized during the day and degraded at night to fuel growth and metabolism. Starch is degraded primarily by β -amylases, liberating maltose, but this activity is preceded by glucan phosphorylation and is accompanied by dephosphorylation. A glucan phosphatase family member, LIKE SEX4 1 (LSF1), binds starch and is required for normal starch degradation. Schreier et al. (pages 2169–2186) show that LSF1 does not dephosphorylate glucans, and that glucan binding, but not phosphatase activity, is required for the function of LSF1 in starch degradation. They propose that LSF1 binds β -amylases at the starch granule surface, thereby promoting starch degradation. The cover images show *Arabidopsis* rosettes harvested at the end of the night and stained for starch with iodine. The lightly stained plants are either wild type, *lsf1* mutant complemented with LSF1, or *lsf1* mutant complemented with LSF1 carrying a mutated phosphatase domain. The dark-stained plants are uncomplemented *lsf1* mutants or *lsf1* mutants complemented with LSF1 carrying a mutated starch binding domain: these plants incompletely degrade their starch during the night and thus accumulate excess starch.

EDITORIAL

Sebastian Bednarek 1931
Christian Danve M. Castroverde

IN BRIEF

Senescence: The Genetics behind Stay-Green Corn^[OPEN] 1934
Céline Caseys

To Golgi and Beyond!^[OPEN] 1936
Emily Breeze

Polyploid Pairing Problems: How Centromere Repeat Divergence Helps Wheat Sort It All Out^[OPEN] 1938
Jennifer Mach

In the Pale Red Light: Control of Pre-mRNA Splicing by RRC1 and SFPS^[OPEN] 1940
Patrice A. Salomé

Avoiding Shade To Grow Taller but Not Always Stronger: Phytochrome–Jasmonic Acid Interplay^[OPEN] 1941
Anne C. Rea

Resistance on Tap: PDR Transporters Direct Antimicrobial Metabolites Toward Invading Pathogens^[OPEN] 1943
Philip Carella

REVIEW

Ribosome Biogenesis in Plants: From Functional 45S Ribosomal DNA Organization to Ribosome Assembly Factors^[OPEN] 1945
Julio Sáez-Vásquez and Michel Delseny

LARGE-SCALE BIOLOGY ARTICLES

Integrated Genome-Scale Analysis Identifies Novel Genes and Networks Underlying Senescence in Maize^[OPEN] 1968
Rajandeeep S. Sekhon, Christopher Saski, Rohit Kumar, Barry S. Flinn, Feng Luo, Timothy M. Beissinger, Arlyn J. Ackerman, Matthew W. Breitzman, William C. Bridges, Natalia de Leon, and Shawn M. Kaeppeler

Editor in Chief
Sabeeha Merchant

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

Managing Editor
Jennifer A. Regala

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

Online at www.plantcell.org

Evolutionary Metabolomics Identifies Substantial Metabolic Divergence between Maize and Its Wild Ancestor, Teosinte^[OPEN] 1990
Guanghai Xu, Jingjing Cao, Xufeng Wang, Qiuyue Chen, Weiwei Jin, Zhen Li, and Feng Tian

Separating Golgi Proteins from *Cis* to *Trans* Reveals Underlying Properties of Cisternal Localization^[OPEN] 2010
Harriet T. Parsons, Tim J. Stevens, Heather E. McFarlane, Silvia Vidal-Melgosa, Johannes Griss, Nicola Lawrence, Richard Butler, Mirta M.L. Sousa, Michelle Salemi, William G.T. Willats, Christopher J. Petzold, Joshua L. Heazlewood, and Kathryn S. Lilley

RESEARCH ARTICLES

Centromere Satellite Repeats Have Undergone Rapid Changes in Polyploid Wheat Subgenomes^[OPEN] 2035
Handong Su, Yalin Liu, Chang Liu, Qinghua Shi, Yuhong Huang, and Fangpu Han

Coordinated Regulation of Pre-mRNA Splicing by the SFPS-RRC1 Complex to Promote Photomorphogenesis 2052
Ruijiao Xin, Praveen Kumar Kathare, and Enamul Huq

Differential UVR8 Signal across the Stem Controls UV-B-Induced Inflorescence Phototropism 2070
Lucas Vanhaelewyn, András Viczián, Els Prinsen, Péter Bernula, Alejandro Miguel Serrano, Maria Veronica Arana, Carlos L. Ballaré, Ferenc Nagy, Dominique Van Der Straeten, and Filip Vandenbussche

Arabidopsis *FHY3* and *FAR1* Regulate the Balance between Growth and Defense Responses under Shade Conditions^[OPEN] 2089
Yang Liu, Hongbin Wei, Mengdi Ma, Quanquan Li, Dexin Kong, Juan Sun, Xiaojing Ma, Baobao Wang, Cuixia Chen, Yurong Xie, and Haiyang Wang

A GmSIN1/GmNCE3s/GmRbohBs Feed-Forward Loop Acts as a Signal Amplifier That Regulates Root Growth in Soybean Exposed to Salt Stress^[OPEN] 2107
Shuo Li, Nan Wang, Dandan Ji, Wenxiao Zhang, Ying Wang, Yanchong Yu, Shizhen Zhao, Menghua Lyu, Juanjuan You, Yangyang Zhang, Luli Wang, Xiaofang Wang, Zhenhua Liu, Jianhua Tong, Langtao Xiao, Ming-yi Bai, and Fengning Xiang

Mutual Regulation of Receptor-Like Kinase SIT1 and B'κ-PP2A Shapes the Early Response of Rice to Salt Stress 2131
Ji-Long Zhao, Li-Qing Zhang, Ning Liu, Shou-Ling Xu, Zhi-Liang Yue, Lu-Lu Zhang, Zhi-Ping Deng, Alma L. Burlingame, Da-Ye Sun, Zhi-Yong Wang, Ying Sun, and Sheng-Wei Zhang

RST1 Is a FREE1 Suppressor That Negatively Regulates Vacuolar Trafficking in Arabidopsis 2152
Qiong Zhao, Jinbo Shen, Caiji Gao, Yong Cui, Yongyi Wang, Jie Cui, Lixin Cheng, Wenhan Cao, Ying Zhu, Shuxian Huang, Qianzi Zhou, Cheuk Ka Leong, King Pong Leung, Xuemei Chen, and Liwen Jiang

LIKE SEX4 1 Acts as a β-Amylase-Binding Scaffold on Starch Granules during Starch Degradation^[OPEN] 2169
Tina B. Schreier, Martin Umhang, Sang-Kyu Lee, Wei-Ling Lue, Zhouxin Shen, Dylan Silver, Alexander Graf, Antonia Müller, Simona Eicke, Martha Stadler-Waibel, David Seung, Sylvain Bischof, Steven P. Briggs, Oliver Kötting, Greg B.G. Moorhead, Jychian Chen, and Samuel C. Zeeman

LEUNIG_HOMOLOG Mediates MYC2-Dependent Transcriptional Activation in Cooperation with the Coactivators HAC1 and MED25^[OPEN] 2187
Yanrong You, Qingzhe Zhai, Chunpeng An, and Chuanyou Li

- The Arabidopsis Pleiotropic Drug Resistance Transporters PEN3 and PDR12 Mediate Camalexin Secretion for Resistance to *Botrytis cinerea*** 2206
Yunxia He, Juan Xu, Xiaoyang Wang, Xiaomeng He, Yangxiayu Wang, Jinggeng Zhou, Shuqun Zhang, and Xiangzong Meng
- The F-Box Protein SAGL1 and ECERIFERUM3 Regulate Cuticular Wax Biosynthesis in Response to Changes in Humidity in Arabidopsis^[OPEN]** 2223
Hyojin Kim, Si-in Yu, Seh Hui Jung, Byeong-ha Lee, and Mi Chung Suh
- A Photosynthesis-Specific Rubredoxin-Like Protein Is Required for Efficient Association of the D1 and D2 Proteins during the Initial Steps of Photosystem II Assembly** 2241
Éva Kiss, Jana Knoppová, Guillem Pascual Aznar, Jan Pilný, Jianfeng Yu, Petr Halada, Peter J. Nixon, Roman Sobotka, and Josef Komenda
- Meiotic DNA Repair in the Nucleolus Employs a Nonhomologous End-Joining Mechanism^[OPEN]** 2259
Jason Sims, Gregory P. Copenhaver, and Peter Schlögelhofer

CORRECTION

- Zhang, Q., Ma, C., Zhang, Y., Gu, Z., Li, W., Duan, X., Wang, S., Hao, L., Wang, Y., Wang, S., and Li, T. (2018). A Single-Nucleotide Polymorphism in the Promoter of a Hairpin RNA Contributes to *Alternaria alternata* Leaf Spot Resistance in Apple (*Malus × domestica*). *Plant Cell* 30: 1924–1942; DOI: <https://doi.org/10.1105/tpc.18.00042>. 2276

^[OPEN] Articles can be viewed without a subscription.



The Plant Cell (eISSN 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 subscription price is based on type of institution; contact institution@aspb.org. 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. 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. 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 18, 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