

On the Cover: Turgor-driven valves on the plant epidermis, stomata, are essential for the growth and survival of land plants and of far-reaching importance to our global environment as well as food security. A series of cartoons show stereotypical steps of stomatal differentiation in dicots, such as *Arabidopsis*, emphasizing the roles of ion transport for proper stomatal movement, allowing carbon dioxide uptake while releasing oxygen and promoting transpirations. Background images emphasize the impact of stomata on atmospheric environment (top left), successful land plants colonization (top middle), and crop production (top right). Images at the bottoms highlight the conserved nature of key stomatal regulatory genes in the basal land plant *Physcomitrella patens* (bottom left) and the loss of regulation of one such gene product, SCREAM, conferring an epidermis solely composed of stomata (bottom right). Cover art by Haruko Hirukawa, The photo of *Physcomitrella* is provided by Mitsuyasu Hasebe, and a confocal microscopy image of *Arabidopsis scrm-D* epidermis is provided by Keiko Torii.

FOCUS ISSUE ON STOMATA

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[^{OPEN}] Stomatal Closure, Basal Leaf Embolism, and Shedding Protect the Hydraulic Integrity of Grape Stems. Uri Hochberg, Carel W. Windt, Alexandre Ponomarenko, Yong-Jiang Zhang, Jessica Gersony, Fulton E. Rockwell, and N. Michele Holbrook

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[^{CC-BY}] Reducing Stomatal Density in Barley Improves Drought Tolerance without Impacting on Yield. Jon Hughes, Christopher Hepworth, Chris Dutton, Jessica A. Dunn, Lee Hunt, Jennifer Stephens, Robbie Waugh, Duncan D. Cameron, and Julie E. Gray

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Hornwort Stomata: Architecture and Fate Shared with 400-Million-Year-Old Fossil Plants without Leaves. Karen S. Renzaglia, Juan Carlos Villarreal, Bryan T. Piatkowski, Jessica R. Lucas, and Amelia Merced

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[OPEN] Disrupting Flavone Synthase II Alters Lignin and Improves Biomass Digestibility. Pui Ying Lam, Yuki Tobimatsu, Yuri Takeda, Shiro Suzuki, Masaomi Yamamura, Toshiaki Umezawa, and Clive Lo

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Acyl-CoA:Lysophosphatidylethanolamine Acyltransferase Activity Regulates Growth of Arabidopsis. *Katarzyna Jasieniicka-Gazarkiewicz, Ida Lager, Anders S. Carlsson, Katharina Gutbrod, Helga Peisker, Peter Dörmann, Sten Stymne, and Antoni Banaś*

The activity of LPEAT affects the growth of Arabidopsis and is essential for maintaining an adequate level of PE, LPE, and LPC in the cells.

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^[CC-BY]Genomic Insights into the Evolution of the Nicotine Biosynthesis Pathway in Tobacco. *Masataka Kajikawa, Nicolas Sierro, Haruhiko Kawaguchi, Nicolas Bakaher, Nikolai V. Ivanov, Takashi Hashimoto, and Tsubasa Shoji*

A series of metabolic and transport genes involved in the nicotine pathway form a regulon under the control of jasmonate-responsive transcription factors in tobacco.

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^[OPEN]Regulatory Phosphorylation of Bacterial-Type PEP Carboxylase by the Ca²⁺-Dependent Protein Kinase RcCDPK1 in Developing Castor Oil Seeds. *Sheng Ying, Allyson T. Hill, Michal Pyc, Erin M. Anderson, Wayne A. Snedden, Robert T. Mullen, Yi-Min She, and William C. Plaxton*

RcCDPK1 catalyzes in vivo inhibitory phosphorylation of the bacterial-type PEP carboxylase subunits of the novel heteromeric Class-2 PEPC complex of developing castor beans.

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^[OPEN]Defining the Diverse Cell Populations Contributing to Lignification in Arabidopsis Stems. *Rebecca A. Smith, Mathias Schuetz, Steven D. Karlen, David Bird, Naohito Tokunaga, Yasushi Sato, Shawn D. Mansfield, John Ralph, and A. Lacey Samuels*

Xylem vessel lignification in young Arabidopsis stems requires neighboring xylary parenchyma, but, as stems mature, fibers primarily produce their own lignin monomers.

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^[OPEN]LIL3, a Light-Harvesting Complex Protein, Links Terpenoid and Tetrapyrrole Biosynthesis in Arabidopsis thaliana. *Daniel Hey, Maxi Rothbart, Josephine Herbst, Peng Wang, Jakob Müller, Daniel Wittmann, Kirsten Gruhl, and Bernhard Grimm*

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^[OPEN]Roles of Dicer-Like Proteins 2 and 4 in Intra- and Intercellular Antiviral Silencing. *Cheng Qin, Bin Li, Yaya Fan, Xian Zhang, Zhiming Yu, Eugene Ryabov, Mei Zhao, Hui Wang, Nongnong Shi, Pengcheng Zhang, Stephen Jackson, Mahmut Tör, Qi Cheng, Yule Liu, Philippe Gallusci, and Yiguo Hong*

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^[OPEN]Excess Diffuse Light Absorption in Upper Mesophyll Limits CO₂ Drawdown and Depresses Photosynthesis. J. Mason Earles, Guillaume Thérroux-Rancourt, Matthew E. Gilbert, Andrew J. McElrone, and Craig R. Brodersen

Excess absorption of diffuse versus direct light in the upper mesophyll of Helianthus annuus sun leaves leads to suboptimal photosynthesis.

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GENES, DEVELOPMENT, AND EVOLUTION

Transcription Factor Interplay between LEAFY and APETALA1/CAULIFLOWER during Floral Initiation. Kevin Goslin, Beibei Zheng, Antonio Serrano-Mislata, Liina Rae, Patrick T. Ryan, Kamila Kwaśniewska, Bennett Thomson, Diarmuid S. Ó'Maoiléidigh, Francisco Madueño, Frank Wellmer, and Emmanuelle Graciet

LEAFY and APETALA1/CAULIFLOWER have partially antagonistic activities in the control of floral initiation.

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^[OPEN]UV-B Inhibits Leaf Growth through Changes in Growth Regulating Factors and Gibberellin Levels. Julieta Fina, Romina Casadevall, Hamada AbdElgawad, Els Prinsen, Marios N. Markakis, Gerrit T. S. Beemster, and Paula Casati

Solar UV-B inhibits leaf growth in maize by suppressing cell proliferation, a response mediated through a decrease in GAs in the growth zone.

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Small kernel2 Encodes a Glutaminase in Vitamin B₆ Biosynthesis Essential for Maize Seed Development. Yan-Zhuo Yang, Shuo Ding, Yong Wang, Cui-Ling Li, Yun Shen, Robert Meeley, Donald R. McCarty, and Bao-Cai Tan

A small kernel mutant in maize highlights vitamin B₆ biosynthesis in embryogenesis and endosperm development.

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^[OPEN]Night-Break Experiments Shed Light on the Photoperiod1-Mediated Flowering. Stephen Pearce, Lindsay M. Shaw, Huiqiong Lin, Jennifer D. Cotter, Chengxia Li, and Jorge Dubcovsky

Interruptions of long nights by short pulses of light ("night-break") for several days accelerates wheat flowering, but only in the presence of the PHOTOPERIOD1 gene.

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^[OPEN]A Rice PECTATE LYASE-LIKE Gene Is Required for Plant Growth and Leaf Senescence. Yujia Leng, Yaolong Yang, Deyong Ren, Lichao Huang, Liping Dai, Yuqiong Wang, Long Chen, Zhengjun Tu, Yihong Gao, Xueyong Li, Li Zhu, Jiang Hu, Guangheng Zhang, Zhenyu Gao, Longbiao Guo, Zhaosheng Kong, Yongjun Lin, Qian Qian, and Dali Zeng

DEL1 affects rice growth and leaf senescence mediated by PECTATE LYASE-LIKE genes.

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GmILPA1, Encoding an APC8-like Protein, Controls Leaf Petiole Angle in Soybean. Jinshan Gao, Suxin Yang, Wen Cheng, Yongfu Fu, Jiantian Leng, Xiaohui Yuan, Ning Jiang, Jianxin Ma, and Xianzhong Feng

An APC8-like protein regulates leaf petiole angle by modulating establishment of pulvinus in soybean.

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[^{OPEN}] Functional Conservation and Divergence among Homoeologs of *TaSPL20* and *TaSPL21*, Two SBP-Box Genes Governing Yield-Related Traits in Hexaploid Wheat. Bin Zhang, Weina Xu, Xia Liu, Xinguo Mao, Ang Li, Jingyi Wang, Xiaoping Chang, Xueyong Zhang, and Ruilian Jing

The triplicated homoeologs of two paralogous TaSPL loci display diverse functions in governing yield-related traits in hexaploid wheat.

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[^{OPEN}] Concerted Divergence after Gene Duplication in Polycomb Repressive Complexes. Yichun Qiu, Shao-Lun Liu, and Keith L. Adams

FIS2 and MEA have diverged in concert after simultaneous gene duplication, resulting in functional divergence of the PRC2 complexes in Brassicaceae, which is a novel fate for duplicated genes whose products act in complexes.

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[^{OPEN}] SDG2-Mediated H3K4me3 Is Crucial for Chromatin Condensation and Mitotic Division during Male Gametogenesis in Arabidopsis. Violaine Pinon, Xiaozhen Yao, Aiwu Dong, and Wen-Hui Shen

Active H3K4me3 deposition is essential for gametophyte chromatin landscape, playing critical roles in gamete mitotic cell cycle progression and pollen vegetative cell function.

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SIGNALING AND RESPONSE

[^{OPEN}] Heat Shock Protein HSP101 Affects the Release of Ribosomal Protein mRNAs for Recovery after Heat Shock. Rémy Merret, Marie-Christine Carpentier, Jean-Jacques Favory, Claire Picart, Julie Descombin, Cécile Bousquet-Antonelli, Pascal Tillard, Laurence Lejay, Jean-Marc Deragon, and Yee-yung Charng

mRNAs coding for ribosomal proteins are preferentially stored during heat shock and released during recovery phase to enhance ribosome production in an HSP101-dependent manner.

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[^{CC-BY}] MAP Kinase PrMPK9-1 Contributes to the Self-Incompatibility Response. Lijun Chai, Richard L. Tudor, Natalie S. Poulter, Katie A. Wilkins, Deborah J. Eaves, F. Christopher H. Franklin, and Veronica E. Franklin-Tong

A TDY-class MAPK is functionally involved in mediating self-incompatibility in Papaver.

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Constitutively Active Arabidopsis MAP Kinase 3 Triggers Defense Responses Involving Salicylic Acid and SUMM2 Resistance Protein. Baptiste Genot, Julien Lang, Souha Berriri, Marie Garmier, Françoise Gilard, Stéphanie Pateyron, Katrien Haustraete, Dominique Van Der Straeten, Heribert Hirt, and Jean Colcombet

The stress-activated MPK3 and the SUPPRESSOR OF MKK1 MKK2 1/2 module control a similar set of responses, which include accumulation of salicylic acid, reactive oxygen species, and phytoalexins and modulation of defense genes.

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[^{OPEN}] Regulation of Strigolactone Biosynthesis by Gibberellin Signaling. Shinsaku Ito, Daichi Yamagami, Mikihisa Umehara, Atsushi Hanada, Satoko Yoshida, Yasuyuki Sasaki, Shunsuke Yajima, Junko Kyojuka, Miyako Ueguchi-Tanaka, Makoto Matsuoka, Ken Shirasu, Shinjiro Yamaguchi, and Tadao Asami

*GA regulates SL biosynthesis through the GA receptor *GID1* and F-box protein *GID2*.*

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Brassinosteroid Biosynthesis Is Modulated via a Transcription Factor Cascade of COG1, PIF4, and PIF5.
Zhuoyun Wei, Tong Yuan, Danuše Tarkowská, Jeongsik Kim, Hong Gil Nam, Ondřej Novák, Kai He, Xiaoping Gou, and Jia Li

Transcriptional control of brassinosteroid biosynthesis genes engages a transcription factor cascade in Arabidopsis.

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Tetrahydrofolate Modulates Floral Transition through Epigenetic Silencing. *Lei Wang, Dongdong Kong, Qiang Lv, Guoqi Niu, Tingting Han, Xuanchao Zhao, Shulin Meng, Qian Cheng, Shouchun Guo, Jing Du, Zili Wu, Jinzheng Wang, Fang Bao, Yong Hu, Xiaojun Pan, Jinchan Xia, Dong Yuan, Lida Han, Tong Lian, Chunyi Zhang, Haiyang Wang, Xin-Jian He, and Yi-kun He*

Folate regulates DNA methylation to affect Arabidopsis flowering time.

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