The oomycete pathogen *Phytophthora infestans* has a cell wall composed mainly of cellulose, by contrast with most fungal pathogens, which have chitin-based cell walls. During infection, *P. infestans* breaks down host cell walls but synthesizes a new cell wall of its own to make infection-associated structures and grow and proliferate within the host. Grenville-Briggs et al. (pages 720–738) present a functional characterization of a family of four *P. infestans* cellulose synthase (CesA) genes, which form a distinct phylogenetic group that is most closely related to cyanobacterial CesA genes. The authors show that expression of all four genes is upregulated during early infection stages of potato, and chemical inhibition of cellulose synthesis leads to defects in the infection process and a complete loss of pathogenicity. These results show that cellulose synthesis is required for infection of potato by *P. infestans*.

**IN THIS ISSUE**

**Oxylipin Signaling in Plant Stress Responses**
Nancy A. Eckardt

**IN BRIEF**

The IMEter Predicts an Intron’s Ability to Boost Gene Expression
Kathleen L. Farquharson

Aquaporins and Chloroplast Membrane Permeability
Nancy A. Eckardt

Cellulose Synthesis in *Phytophthora infestans* Pathogenesis
Jennifer Mach

Heritability of the Tomato Fruit Metabolome
Nancy A. Eckardt

**CURRENT PERSPECTIVE ESSAY**

**SPECIAL SERIES ON LARGE-SCALE BIOLOGY**

Pond Scum Genomics: The Genomes of *Chlamydomonas* and *Ostreococcus*
Graham Peers and Krishna K. Niyogi

**RESEARCH ARTICLES**

Mode of Inheritance of Primary Metabolic Traits in Tomato
Nicolas Schauer, Yaniv Semel, Ilse Balbo, Matthias Steinfath, Dirk Repsilber, Joachim Selbig, Tzili Pleban, Dani Zamir, and Alisdair R. Fernie

The Leaf Epidermome of *Catharanthus roseus* Reveals Its Biochemical Specialization
Jun Murata, Jonathon Roepke, Heather Gordon, and Vincenzo De Luca

Promoter-Proximal Introns in *Arabidopsis thaliana* Are Enriched in Dispersed Signals that Elevate Gene Expression
Alan B. Rose, Tali Eifers, Genis Parra, and Ian Korf

Heme, a Plastid-Derived Regulator of Nuclear Gene Expression in *Chlamydomonas*
Erika D. von Gromoff, Ali Alawady, Linda Meinecke, Bernhard Grimm, and Christoph F. Beck
The Highly Similar Arabidopsis Homologs of Trithorax ATX1 and ATX2 Encode Proteins with Divergent Biochemical Functions

Abdelaty Saleh, Raul Alvarez-Venegas, Mehtap Yilmaz, Oahn-Le, Guichuan Hou, Monther Saddier, Ayed Al-Abdallat, Yuannan Xia, Guoqinq Lu, Istvan Ladunga, and Zoya Avramova

ARABIDOPSIS TRITHORAX1 Dynamically Regulates FLOWERING LOCUS C Activation via Histone 3 Lysine 4 Trimethylation

Stephane Pien, Delphine Fleurie, Joshua S. Mylne, Pedro Crevillen, Dirk Inzé, Zoya Avramova, Caroline Dean, and Ueli Grossniklaus

EMB2473/MIRO1, an Arabidopsis Miro GTPase, Is Required for Embryogenesis and Influences Mitochondrial Morphology in Pollen

Shohei Yamaoka and Christopher J. Leaver

Haplo-Insufficiency of MPK3 in MPK6 Mutant Background Uncover a Novel Function of These Two MAPKs in Arabidopsis Ovule Development

Huachun Wang, Yidong Liu, Kristin Bruffett, Justin Lee, Gerd Hause, John C. Walker, and Shuqun Zhang

Exclusion of a Proton ATPase from the Apical Membrane Is Associated with Cell Polarity and Tip Growth in Nicotiana tabacum Pollen Tubes

Ana C. Certal, Ricardo B. Almeida, Lara M. Carvalho, Eric Wong, Nuno Moreno, Erwan Michard, Jorge Carneiro, Joaquín Rodrigúez-Léon, Hen-Ming Wu, Alice Y. Cheung, and José A. Feijó

The AGL62 MADS Domain Protein Regulates Cellularization during Endosperm Development in Arabidopsis

Il-Ho Kang, Joshua G. Steffen, Michael F. Portereiko, Alan Lloyd, and Gary N. Drews

Function of Nicotiana tabacum Aquaporins as Chloroplast Gas Pores Challenges the Concept of Membrane CO2 Permeability

Norbert Uehlein, Beate Otto, David T. Hanson, Matthias Fischer, Nate McDowell, and Ralf Kaldenhoff

The Arabidopsis P-ATPase ALA3 Localizes to the Golgi and Requires a β-Subunit to Function in Lipid Translocation and Secretory Vesicle Formation


The Arabidopsis thaliana Type I Isopentenyl Diphosphate Isomerases Are Targeted to Multiple Subcellular Compartments and Have Overlapping Functions in Isoprenoid Biosynthesis

Michael A. Phillips, John C. D'Auria, Jonathan Gershenzon, and Eran Pichersky

The F-Box Protein ACRE189/ACIF1 Regulates Cell Death and Defense Responses Activated during Pathogen Recognition in Tobacco and Tomato

Harrold A. van den Burg, Dimitrios I. Tsitsigiannis, Owen Rowland, Jane Lo, Ghanasayam Rallapalli, Daniel MacLean, Frank L.W. Takken, and Jonathan D.G. Jones

Cellulose Synthesis in Phytophthora infestans Is Required for Normal Appressorium Formation and Successful Infection of Potato


The Coiled-Coil and Nucleotide Binding Domains of the Potato Rx Disease Resistance Protein Function in Pathogen Recognition and Signaling

Gregory J. Rairdan, Sarah M. Collier, Melanie A. Sacco, Thomas T. Baldwin, Teresa Boetrich, and Peter Moffett
A MYB Transcription Factor Regulates Very-Long-Chain Fatty Acid Biosynthesis for Activation of the Hypersensitive Cell Death Response in *Arabidopsis*  
Sylvain Raffaele, Fabienne Vailleau, Amandine Léger, Jérôme Joubès, Otto Miersch, Carine Huard, Elisabeth Blê, Sébastien Mongrand, Frédéric Domergue, and Dominique Roby

General Detoxification and Stress Responses Are Mediated by Oxidized Lipids through TGA Transcription Factors in *Arabidopsis*  
Stefan Mueller, Beate Hilbert, Katharina Dueckershoff, Thomas Roitsch, Markus Krischke, Martin J. Mueller, and Susanne Berger

Modulation of Nitrosative Stress by S-Nitrosoglutathione Reductase Is Critical for Thermotolerance and Plant Growth in *Arabidopsis*  
Ung Lee, Chris Wie, Bernadette O. Fernandez, Martin Feelisch, and Elizabeth Vierling

*Phospholipase Dα3 Is Involved in the Hyperosmotic Response in Arabidopsis*  
Yueyun Hong, Xiangqing Pan, Ruth Welti, and Xuemin Wang

Online version contains Web-only data.  
Open Access articles can be viewed online without a subscription.