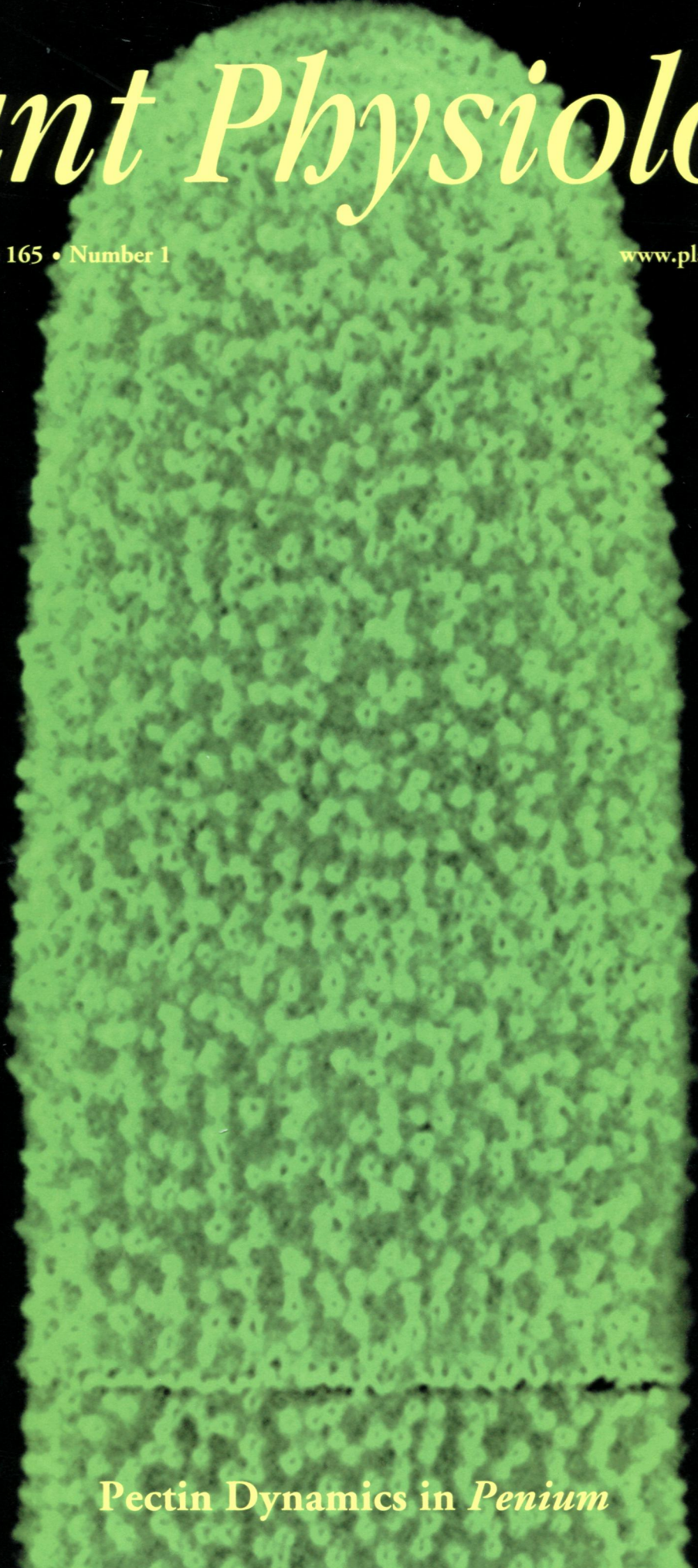


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Pectin Dynamics in Penium

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On the Cover: Cell walls constitute complex composites of macromolecules that are of profound importance to the life of plant cells. Synthesized and secreted by highly dynamic biosynthetic machinery, the polymeric constituents must be accurately deposited into the microarchitecture of the wall in order for it to function competently. Presently, these structural and developmental properties, especially as they contribute to interactive polymeric networks in the wall, are poorly resolved. In this issue, Domozych et al. (pp. 105–118) employ the unicellular charophyte green alga, *Penium margaritaceum*, to investigate pectin architecture and dynamics in the cell wall. The outer layer of the wall is comprised of homogalacturonan fibrils that form dense aggregates that organize into a distinct outer lattice. Changes to lattice architecture may be directly monitored in live cells grown under different experimental conditions. This includes variations in levels of cations (e.g. calcium), exogenous pectin, pectin methylesterase, and pectate lyase. Pectin deposition is focused at a thin band at the cell isthmus and is part of a wall expansion mechanism that occurs in a distinct bidirectional fashion. These results highlight the efficiency of *P. margaritaceum* as a unicellular model organism for cell wall studies and provide new insight into pectin-based functions, including adhesion and cell shape maintenance. The cover shows the outer pectin lattice of the cell wall labeled with the anti-homogalacturonan monoclonal antibody, LM18. Cover image credits: David Domozych.

ON THE INSIDE

Peter V. Minorsky

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BREAKTHROUGH TECHNOLOGIES

[W][OPEN] High-Efficiency Stable Transformation of the Model Fern Species *Ceratopteris richardii* via Microparticle Bombardment. Andrew R.G. Plackett, Liandong Huang, Heather L. Sanders, and Jane A. Langdale

A highly efficient method transforms fern callus tissue, with rapid and simple selection for stable transgenic lines through antibiotic selection.

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[W][OPEN] New Generation of Artificial MicroRNA and Synthetic Trans-Acting Small Interfering RNA Vectors for Efficient Gene Silencing in Arabidopsis. Alberto Carbonell, Atsushi Takeda, Noah Fahlgren, Simon C. Johnson, Josh T. Cuperus, and James C. Carrington

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[W][OPEN] Multigene Engineering of Triacylglycerol Metabolism Boosts Seed Oil Content in Arabidopsis. Harrie van Erp, Amélie A. Kelly, Guillaume Menard, and Peter J. Eastmond

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[W] Metabolic Flux Analysis of Plastidic Isoprenoid Biosynthesis in Poplar Leaves Emitting and Nonemitting Isoprene. Andrea Ghirardo, Louwranee Peter Wright, Zhen Bi, Maaria Rosenkranz, Pablo Pulido, Manuel Rodríguez-Concepción, Ülo Niinemets, Nicolas Brüggemann, Jonathan Gershenzon, and Jörg-Peter Schnitzler

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[W][OPEN]Comparing the in Vivo Function of α -Carboxysomes and β -Carboxysomes in Two Model Cyanobacteria. Lynne Whitehead, Benedict M. Long, G. Dean Price, and Murray R. Badger

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^{[W][OPEN]}Pectin Metabolism and Assembly in the Cell Wall of the Charophyte Green Alga *Penium margaritaceum*. David S. Domozych, Iben Sørensen, Zoë A. Popper, Julie Ochs, Amanda Andreas, Jonatan U. Fangel, Anna Pielach, Carly Sacks, Hannah Brechka, Pia Ruisi-Besares, William G.T. Willats, and Jocelyn K.C. Rose

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^{[C][W][OPEN]}Plastid Osmotic Stress Activates Cellular Stress Responses in Arabidopsis.

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^[W]Dynamics and Organization of Cortical Microtubules as Revealed by Superresolution Structured Illumination Microscopy. George Komis, Martin Mistrik, Olga Šamajová, Anna Doskočilová, Miroslav Ovečka, Peter Illés, Jiri Bártek, and Jozef Šamaj

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^[W]A Comprehensive Analysis of MicroProteins Reveals Their Potentially Widespread Mechanism of Transcriptional Regulation. Enrico Magnani, Niek de Klein, Hye-In Nam, Jung-Gun Kim, Kimberly Pham, Elisa Fiume, Mary Beth Mudgett, and Seung Yon Rhee

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^{[W][OPEN]}OsmiR396d-Regulated OsGRFs Function in Floral Organogenesis in Rice through Binding to Their Targets OsJM1706 and OsCR4. Huanhuan Liu, Siyi Guo, Yunyuan Xu, Chunhua Li, Zeyong Zhang, Dajian Zhang, Shujuan Xu, Cui Zhang, and Kang Chong

MicroRNA-regulated growth-regulating factors activate expression of specific targets to regulate floral organ development, affecting characteristics such as husk openness and sterile lemma length.

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^[OPEN]New Arabidopsis Advanced Intercross Recombinant Inbred Lines Reveal Female Control of Nonrandom Mating. Jonathan Nesbit Fitz Gerald, Ann Louise Carlson, Eoadne Smith, Julin N. Maloof, Detlef Weigel, Joanne Chory, Justin O. Borevitz, and Robert John Swanson

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^[W]Non-Cell-Autonomous Regulation of Root Hair Patterning Genes by WRKY75 in Arabidopsis. Louai Rishmawi, Martina Pesch, Christian Juengst, Astrid C. Schauss, Andrea Schrader, and Martin Hülskamp

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^[OPEN]Truncation of LEAFY COTYLEDON1 Protein Is Required for Asexual Reproduction in *Kalanchoë daigremontiana*. Helena M.P. Garcês, Daniel Koenig, Brad T. Townsley, Minsung Kim, and Neelima R. Sinha

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^[W]Evolution of Gene Structural Complexity: An Alternative-Splicing-Based Model Accounts for Intron-Containing Retrogenes. *Chengjun Zhang, Andrea R. Gschwend, Yidan Ouyang, and Manyuan Long*

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^[W]Hybridization Alters Spontaneous Mutation Rates in a Parent-of-Origin-Dependent Fashion in Arabidopsis. *Tufail Bashir, Christian Sailer, Florian Gerber, Nitin Loganathan, Hemadev Bhoopalan, Christof Eichenberger, Ueli Grossniklaus, and Ramamurthy Baskar*

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^{[C][W]}Proton Gradient Regulation5-Mediated Cyclic Electron Flow under ATP- or Redox-Limited Conditions: A Study of Δ ATPase *pgr5* and Δ rbcL *pgr5* Mutants in the Green Alga *Chlamydomonas reinhardtii*. *Xenie Johnson, Janina Steinbeck, Rachel M. Dent, Hiroko Takahashi, Pierre Richaud, Shin-Ichiro Ozawa, Laura Houille-Vernes, Dimitris Petroustos, Fabrice Rappaport, Arthur R. Grossman, Krishna K. Niyogi, Michael Hippler, and Jean Alric*

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^{[W][OPEN]}The Response of Cyclic Electron Flow around Photosystem I to Changes in Photorespiration and Nitrate Assimilation. *Berkley J. Walker, Deserah D. Strand, David M. Kramer, and Asaph B. Cousins*

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^{[C][W]}The Redox Potential of the Plastoquinone Pool of the Cyanobacterium *Synechocystis* Species Strain PCC 6803 Is under Strict Homeostatic Control. *R. Milou Schuurmans, J. Merijn Schuurmans, Martijn Bekker, Jacco C. Kromkamp, Hans C.P. Matthijs, and Klaas J. Hellingwerf*

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^{[W][OPEN]}A Subfamily of Putative Cytokinin Receptors Is Revealed by an Analysis of the Evolution of the Two-Component Signaling System of Plants. *Nijuscha Gruhn, Mhyeddeen Halawa, Berend Snel, Michael F. Seidl, Alexander Heyl*

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

^[W] The online version of this article contains Web-only data.

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