On the Cover: Root system architecture and development traditionally have been difficult to measure with high throughput and accuracy. Using a transparent gellan gum growth system, root systems can be digitally captured and quantified as they grow. By combining improved root imaging and computational analysis techniques, it is now possible to reconstruct root systems in three dimensions and quantify specific root system architecture traits. The current work and other recent research on root system architecture have revealed a wide range of morphological variation in rice (*Oryza sativa*) root systems, and three-dimensional reconstructions help to visualize and quantify those differences. In this issue, Clark et al. (455–465) present a high-throughput growth, imaging, and analysis platform to phenotype growing root systems in three dimensions. The enhanced quantification capabilities and capacity to image over 100 root systems per day, combined with an expanding array of genotypic resources, will now make it possible to more deeply explore the genetic components of root system architecture as they relate to both developmental processes and root traits associated with the acquisition of limiting resources (e.g. water and phosphorous). Images and root system reconstructions provided by Randy Clark, Janelle Jung, James Jones-Rounds, and Leon Kochian. Volume renderings were performed using the Volume Viewer plug-in for ImageJ software (http://imagej.nih.gov/ij/).

**ON THE INSIDE**

Peter V. Minorsky

**HIGH IMPACT**

To Thy Proteins Be True: RNA Editing in Plants.  
*Aleel K. Grennan*

**BREAKTHROUGH TECHNOLOGIES**

[C][W][OA] Three-Dimensional Root Phenotyping with a Novel Imaging and Software Platform.  
*Randy T. Clark, Robert B. MacCurdy, Janelle K. Jung, Jon E. Shaff, Susan R. McCouch, Daniel J. Aneshansley, and Leon V. Kochian*

*Shaun J. Curtin, Feng Zhang, Jeffry D. Sander, William J. Haun, Colby Starker, Nicholas J. Baltes, Deepak Reyon, Elizabeth J. Dahlborg, Mathew J. Goodwin, Andrew P. Coffman, Drena Dobbs, J. Keith Joung, Daniel F. Voytas, and Robert M. Stupar*

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[W] One Protoplast Is Not the Other!  
*Marianna Faraco, Gian Pietro Di Sansebastiano, Kees Spelt, Ronald E. Koes, and Francesca M. Quattrocchio*

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**BIOCHEMICAL PROCESSES AND MACROMOLECULAR STRUCTURES**

[OA] Starch-Branching Enzyme IIa Is Required for Proper Diurnal Cycling of Starch in Leaves of Maize.  
*Marna D. Yandeau-Nelson, Lieve Laurens, Zi Shi, Huan Xia, Alison M. Smith, and Mark J. Guiltinan*

[OA] The Arabidopsis Transcription Factor LUh/MUM1 Is Required for Extrusion of Seed Coat Mucilage.  
*Jun Huang, Danisha DeBoules, Elahe Esfandiari, Gillian Dean, Nicholas C. Carpita, and George W. Haughn*

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*Jasper J.L. Pengelly, Scott Kearsny, Soumi Bala, John R. Evans, Elena V. Voznesenskaya, Nuria K. Kotevova, Gerald E. Edwards, Robert T. Furben, and Susanne von Caemmerer*

[OA] Identification of a Novel Gene, CIA6, Required for Normal Pyrenoid Formation in *Chlamydomonas reinhardtii*.  
*Yunbing Ma, Steve V. Pollock, Ying Xiao, Khrishen Cunnusamy, and James V. Moroney*
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[WO] The Arabidopsis RING Finger E3 Ligase RHA2b Acts Additively with RHA2a in Regulating Abscisic Acid Signaling and Drought Response. Hongmei Li, Hongling Jiang, Qingyun Bu, Qingzen Zhao, Jiaqiang Sun, Qf Xie, and Chuanyou Li 550


[WO] Flavonols Accumulate Asymmetrically and Affect Auxin Transport in Arabidopsis. Benjamin M. Kuhn, Markus Geisler, Laurent Bigler, and Christoph Ringli 585

[WO] Cell Wall Integrity Controls Root Elongation via a General 1-Aminocyclopropane-1-Carboxylic Acid-Dependent, Ethylene-Independent Pathway. Dat Lu,n Tsang, Clare Edmond, Jennifer Louise Harrington, and Thomas Sebastian Nihlhe 596


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[WO] Control of Abscisic Acid Catabolism and Abscisic Acid Homeostasis Is Important for Reproductive Stage Stress Tolerance in Cereals. Xuemei Ji, Baodi Dong, Behrouz Shiran, Mark J. Talbot, Jane E. Edlington, Trijntje Hughes, Rosemary G. White, Frank Gabler, and Rudy Dolferus 647


[OA] Identification of a Cis-Acting Element of ART1, a C2H2-Type Zinc-Finger Transcription Factor for Aluminum Tolerance in Rice. Tomokazu Tsutsui, Naoki Yamaji, and Jian Feng Ma 925

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[WO] Duplicate Maize Wrinkled1 Transcription Factors Activate Target Genes Involved in Seed Oil Biosynthesis. Benjamin Pouvreau, Sébastien Baud, Vanessa Vernoud, Valérie Morin, Cyrille Py, Ghislaine Gentrot, Jean-Philippe Pichon, Jacques Rouster, Wyatt Paul, and Peter M. Rogowsky 674

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[687][W]Hierarchy and Roles of Pathogen-Associated Molecular Pattern-Induced Responses in *Nicotiana benthamiana*. Cécile Segonzac, Doreen Feke, Selena Gimenez-Ibanez, Dagnar R. Hann, Cyril Zipfel, and John P. Rathjen

[700][W]Transcriptomics of Actinorhizal Symbioses Reveals Homologs of the Whole Common Symbiotic Signaling Cascade. Valérie Hocher, Nicole Alloisio, Florence Augay, Pascale Fournier, Patrick Doumas, Petar Pujic, Hassen Gherbi, Clothilde Queiroux, Corinne Da Silva, Patrick Wincker, Philippe Normand, and Didier Bogusz

[712][C][W]Bacterial and Plant Signal Integration via D3-Type Cyclins Enhances Symptom Development in the Arabidopsis-Rhodococcus fascians Interaction. Elisabeth Stes, Stefania Biondi, Marcelle Holsters, and Danny Vereecke


[741][W][OA]The Unfolded Protein Response Is Triggered by a Plant Viral Movement Protein. Changming Ye, Martin B. Dickman, Steven A. Whitham, Mark Payton, and Jeanmarie Verchot


[770][C][W][OA]Intronic T-DNA Insertion Renders Arabidopsis opr3 a Conditional Jasmonic Acid-Producing Mutant. E. Wassim Chehab, Se Kim, Tatyana Sacenko, Daniel Kleibeinstein, Katayoon Dehesh, and Janet Braam


[793][W][OA]Terpene Down-Regulation in Orange Reveals the Role of Fruit Aromas in Mediating Interactions with Insect Herbivores and Pathogens. Ana Rodríguez, Victoria San Andrés, Magdalena Cervera, Ana Redondo, Berta Alquézar, Takehiko Shimada, José Gadea, María Jesús Rodrigo, Lorenzo Zacarías, Lluís Palou, María M. López, Pedro Castañera, and Leandro Peña

[816][W][OA]GmPep914, an Eight-Amino Acid Peptide Isolated from Soybean Leaves, Activates Defense-Related Genes. Yube Yamaguchi, Guido Barona, Clarence A. Ryan, and Gregory Pearce


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[803][W][OA]Control of Leaf Expansion: A Developmental Switch from Metabolics to Hydraulics. Florent Pantin, Thierry Simonneau, Gaëlle Rolland, Myriam Dauzat, and Bertrand Muller


[832][W][OA]Decline of Leaf Hydraulic Conductance with Dehydration: Relationship to Leaf Size and Venation Architecture. Christine Scoffoni, Michael Rawls, Athena McKown, Hervé Cochard, and Lawren Sack

[892][W][OA]The Role of Bundle Sheath Extensions and Life Form in Stomatal Responses to Leaf Water Status. Thomas N. Buckley, Lawren Sack, and Matthew E. Gilbert

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[844][W][OA]Dynamic Alternations in Cellular and Molecular Components during Blossom-End Rot Development in Tomatoes Expressing sCAX1, a Constitutively Active Ca2+/H+ Antiporter from Arabidopsis. Sergio Tonetto de Freitas, Malket Padda, Qingyu Wu, Sunghun Park, and Elizabeth J. Mitcham
The Bphi008a Gene Interacts with the Ethylene Pathway and Transcriptionally Regulates MAPK Genes in the Response of Rice to Brown Planthopper Feeding. Jing Hu, Jiangbo Zhou, Xinlin Peng, Henghao Xu, Caixiang Liu, Bo Du, Hongyu Yuan, Lili Zhu, and Guangcun He

ABI4 Activates DGAT1 Expression in Arabidopsis Seedlings during Nitrogen Deficiency. Yang Yang, Xiangchun Yu, Lianfen Song, and Chengcai An

EOBII Controls Flower Opening by Functioning as a General Transcriptomic Switch. Thomas A. Colquhoun, Michael L. Schwieterman, Ashlyn E. Wedde, Bernardus C.J. Schimmel, Danielle M. Marciniak, Julian C. Verdonk, Joo Young Kim, Youngjoo Oh, Ivan Galis, Ian T. Baldwin, and David G. Clark

CORRECTIONS


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