On the Cover: Self-incompatibility (SI) is an important genetically controlled mechanism to prevent inbreeding in higher plants. SI involves highly specific interactions during pollination, resulting in the rejection of incompatible (self) pollen. The article by Wilkins et al. (pp. 766–779) describes the pivotal role of SI-induced acidification in mediating programmed cell death (PCD) in the SI response. After an incompatible interaction between the female stigmatic S-determinant, field poppy (Papaver rhoeas) stigma S, and the pollen S-determinant, field poppy pollen S, a signaling cascade is initiated which results in rapid, dramatic acidification of the pollen tube cytosol (green/blue, pH 5.5). Significant acidification occurs within 10 min of SI induction and continues for approximately 60 min. This acidification is essential for the formation of punctate actin foci and PCD in incompatible pollen. The cover shows pseudocolored confocal microscopy images of field poppy pollen tubes labeled with the pH-dependent ratiometric dye, 2,7-bis-(2-carboxyethyl)-5-(and-6)-carboxyfluorescein acetoxymethyl ester. Healthy unchallenged pollen tubes (top two images) have a neutral cytosolic pH (red/orange/yellow; pH 7.15); after SI challenge, the pollen tube cytosol becomes increasingly more acidic as time progresses (yellow/green/pale blue; middle images), reaching pH 5.5 after 60 min (pale blue/dark blue; bottom image). Cover image credits: Katie A. Wilkins (School of Biosciences, University of Birmingham, UK).

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Peter V. Minorsky

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Imaging of Lipids in Microalgae with Coherent Anti-Stokes Raman Scattering Microscopy. Lillie Cavonius, Helen Fink, Juris Kiskis, Eva Albers, Ingrid Undeland, and Annika Enejder

Lipids are accumulated as giant droplets alongside coalescing emerging droplets under excessive lipid storage, in contrast to the multiple micron-sized droplets formed at normal conditions.


Portability of root architecture data with the Root System Markup Language paves the way for central root phenotype repositories.


Genetically encoded sensors enable dynamic monitoring of phosphate concentrations in cells and cell compartments of live plants.

Direct Detection of Transcription Factors in Cotyledons during Seedling Development Using Sensitive Silicon-Substrate Photonic Crystal Protein Arrays. Sarah I. Jones, Yafang Tan, Md Shaminuzzaman, Sherine George, Brian T. Cunningham, and Lila Vodkin

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The green algae Chlamydomonas reinhardtii possesses at least two SUMO conjugates, one involved in housekeeping and the other in response to stress.

Self-Incompatibility-Induced Programmed Cell Death in Field Poppy Pollen Involves Dramatic Acidification of the Incompatible Pollen Tube Cytosol. Katie A. Wilkins, Maurice Bosch, Tamanna Haque, Nianjun Teng, Natalie S. Poulter, and Vernonica E. Franklin-Tong

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Low stomatal conductance and photosynthetic capacity increases Arabidopsis CO₂ growth enhancement under N-limited but not N-sufficient conditions.


Arabidopsis accessions show different phenotypes in response to mild drought, yet a robust transcriptome response is conserved between the accessions.


A transcription factor increases plant productivity by delaying leaf senescence and stimulating leaf cell division, chloroplast division, photosynthesis, and tolerance to nitrogen deprivation.
The mechanism for a stomatal response to vapor pressure deficit evolved from a passive regulation in basal vascular plants to mediation by ABA in the earliest angiosperms.

A KNOTTED1-LIKE HOMEOBOX protein regulates abscission through modulating auxin concentration and transport.

A network of transcription factors regulates arbuscular mycorrhizal symbiosis in Lotus.

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Phloem as Capacitor: Radial Transfer of Water into Xylem of Tree Stems Occurs via Symplastic Transport in Ray Parenchyma. Sebastian Pfautsch, Justine Renard, Mark G. Tjoelker, and Anya Salih

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SENSITIVE TO PROTON RHIZOTOXICITY1, CALMODULIN BINDING TRANSCRIPTION ACTIVATOR2, and Other Transcription Factors Are Involved in ALUMINUM-ACTIVATED MALATE TRANSPORTER1 Expression. Mutsutomo Tokizawa, Yuriko Kobayashi, Tatsunori Saito, Masatomo Kobayashi, Satoshi Iuchi, Mika Nomoto, Yasuomi Tada, Yoshiharu Y. Yamamoto, and Hiroyuki Koyama

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Membrane-Localized Extra-Large G Proteins and Gbg of the Heterotrimeric G Proteins Form Functional Complexes Engaged in Plant Immunity in Arabidopsis. Natsumi Maruta, Yuri Trusov, Eric Brenya, Ureì Parekh, and José Ramón Botella

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ARACINs, Brassicaceae-Specific Peptides Exhibiting Antifungal Activities against Necrotrophic Pathogens in Arabidopsis. Jenny Neukermans, Annelies Inzé, Janick Mathys, Barbara De Coninck, Brigitte van de Cotte, Bruno P.A. Cammue, and Frank Van Breusegem

Two new antimicrobial peptides exhibit antifungal activities against necrotrophic pathogens.

Small Heat Shock Proteins Can Release Light Dependence of Tobacco Seed during Germination. Hyun Jo Koo, Soo Min Park, Keun Pill Kim, Mi Chung Suh, Mi Ok Lee, Seong-Kon Lee, Xia Xinli, and Choo Bong Hong

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