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**HIGH IMPACT**

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**GENOME ANALYSIS**

*Genetic Resources for Maize Cell Wall Biology.*  **Bryan W. Penning, Charles T. Hunter III, Reuben Tayengwa, Andrea L. Ecenlaud, Christopher K. Dugard, Anna T. Olek, Wilfred Vernooy, Karen E. Koch, Donald R. McCarty, Mark F. Davis, Steven R. Thomas, Maureen C. McCann, and Nicholas C. Carpita**

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*A Real-Time Fluorogenic Assay for the Visualization of Glycoside Hydrolase Activity in Planta.*  **Farid M. Ibatullin, Alicja Banasiak, Martin J. Baumann, Lionel Greffe, Junko Takahashi, Ewa J. Mellerowicz, and Harry Brumer**


**BIOINFORMATICS**

*Plant MetGenMAP: An Integrative Analysis System for Plant Systems Biology.*  **Je-Gun Joung, Anthony M. Corbett, Shanna Moore Fellman, Denise M. Tieman, Harry J. Klee, James J. Giovannoni, and Zhangjun Fei**

**On the Cover:** In each plant lineage, some pathways have evolved that diverge from primary metabolism and lead to the synthesis of specialized compounds (secondary metabolites) with diverse ecological roles, many of them involving defense. Some of these compounds can be toxic to a predatory organism through external or internal contact and are occasionally synthesized in dedicated cells such as glandular trichomes, perhaps because they divert primary metabolic pathways and also because they might be toxic to the plant itself. The background image shows the surface of a leaf of a wild tomato (*Solanum habrochaites f. sp. glabratum*) with its dense distribution of glandular trichomes and (out of focus) long, non-glandular trichomes. Superimposed is a scanning electron micrograph image of a single glandular trichome, which serves as the site of synthesis and accumulation of methylketones (mostly 2-tridecanone and 2-undecanone), compounds that are toxic to many insects. In this issue, Ben-Israel et al. (pp. 1952–1964) investigated the polygenic basis for the monophyletic divergence of this metabolic pathway (found in only in one wild species of tomato) from fatty acid biosynthesis. Comprehensive analysis of progeny derived from an interspecific cross between the cultivated and wild species revealed tight correlation between the shape of the glandular trichomes and their methylketone content. In addition, the presence of a wild species-specific transcript for a novel thioesterase, named *Methylketone Synthase2* (MKS2), showed significant correlation with methylketone accumulation as well as epistatic interactions with the previously identified gene MKS1 in this pathway. Cover design and leaf picture made by Eran Pichersky and Eyal Fridman. Photograph of the scanning electron micrograph taken by Jihong Wang.
SCIENTIFIC CORRESPONDENCE


RESEARCH ARTICLES

BIOCHEMICAL PROCESSES AND MACROMOLECULAR STRUCTURES


[C][W][OA] Deciphering Transcriptional and Metabolic Networks Associated with Lysine Metabolism during Arabidopsis Seed Development. Ruthie Angelovici, Aaron Fait, Xiaohong Zhu, Jędrzej Szymanski, Ester Feldmesser, Alisdair R. Fernie, and Gad Galili 2058

BIOENERGETICS AND PHOTOSYNTHESIS


[W] A Cytoplasmically Inherited Barley Mutant Is Defective in Photosystem I Assembly Due to a Temperature-Sensitive Defect in ycf3 Splicing. Alejandra Mabel Landau, Heiko Lokstein, Henrik Vibe Scheller, Verónica Lainez, Sara Maldonado, and Alberto Raúl Prioli 1802

[W][OA] Effect of Rubisco Activase Deficiency on the Temperature Response of CO₂ Assimilation Rate and Rubisco Activation State: Insights from Transgenic Tobacco with Reduced Amounts of Rubisco Activase. Wataru Yamori and Susanne von Caemmerer 2073

CELL BIOLOGY AND SIGNAL TRANSDUCTION


[C][W][OA] Peroxisomes Are Required for in Vivo Nitric Oxide Accumulation in the Cytosol following Salinity Stress of Arabidopsis Plants. Francisco J. Corpas, Makoto Hayashi, Shojo Mano, Mikio Nishimura, and Juan B. Barroso 2083

[W][OA] The Association of the Arabidopsis Actin-Related Protein2/3 Complex with Cell Membranes Is Linked to Its Assembly Status But Not Its Activation. Simeon O. Kotchoni, Taya Zakharova, Eileen L. Mallery, Jie Le, Salah El-Din El-Assal, and Daniel B. Szymanski 2095

DEVELOPMENT AND HORMONE ACTION

[C][OA] Untranslated Regions of a Mobile Transcript Mediate RNA Metabolism. Anjan K. Banerjee, Tian Lin, and David J. Hannapel 1831

[W] Phased Control of Expansin Activity during Leaf Development Identifies a Sensitivity Window for Expansin-Mediated Induction of Leaf Growth. Jennifer Sloan, Andreas Backhaus, Robert Malinowski, Simon McQueen-Mason, and Andrew J. Fleming 1844


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The Impact of Water Deficiency on Leaf Cuticle Lipids of Arabidopsis. Dylan K. Kosma, Brice Bourdenx, Amélie Bernard, Eugene P. Parsons, Shiyou Lu, Jérome Joube`s, and Matthew A. Jenks

Specific Domain Structures Control Abscisic Acid-, Salicylic Acid-, and Stress-Mediated SIZ1 Phenotypes. Mi Sun Cheong, Hyoeng Cheol Park, Mi Ju Hong, Jiyoung Lee, Wonkyun Choi, Jing Bo Jin, Hans J. Bohnert, Sang Yeol Lee, Ray A. Bressan, and Dae-Jin Yun


GENETICS, GENOMICS, AND MOLECULAR EVOLUTION

Extensive Structural Renovation of Retrogene in the Evolution of the Populus Genome. Zhenglin Zhu, Yong Zhang, and Manyuan Long

Multiple Biochemical and Morphological Factors Underlie the Production of Methylketones in Tomato Trichomes. Imri Ben-Israel, Geng Yu, Michael B. Austin, Nazmul Bhuiyan, Michele Auldridge, Thuong Nguyen, Ines Schauvinhold, Joseph P. Noel, Eran Pichersky, and Eyal Fridman

Nucleotide Polymorphism in the Wheat Transcriptional Activator Spa Influences Its Pattern of Expression and Has Pleiotropic Effects on Grain Protein Composition, Dough Viscoelasticity, and Grain Hardness. Catherine Ravel, Pierre Martre, Isabelle Romeuf, Mireille Dardevet, Redouane El-Malki, Jacques Bordes, Nathalie Duchateau, Dominique Brunel, François Balfourier, and Gilles Charmet

PLANTS INTERACTING WITH OTHER ORGANISMS

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An ABC Transporter Mutation Alters Root Exudation of Phytochemicals That Provoked an Overhaul of Natural Soil Microbiota. Dayakar V. Badri, Naira Quintana, Elie G. El Kassis, Hye Kyong Kim, Young Hae Choi, Akifumi Sugiyama, Robert Verpoorte, Enrico Martinola, Daniel K. Manter, and Jorge M. Vivanco

Native Plant and Microbial Contributions to a Negative Plant-Plant Interaction. Gurdeep Bains, Amitha Sampath Kumar, Thimmaraju Rudrappa, Emily Alff, Thomas E. Hanson, and Harsh P. Bais

Airborne Induction and Priming of Plant Defenses against a Bacterial Pathogen. Hwe-Su Yi, Martin Heil, Rosa M. Adame-Alvarez, Daniel J. Ballhorn, and Choong-Min Ryu

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Stomatal Crypts Have Small Effects on Transpiration: A Numerical Model Analysis. Anita Roth-Nebelsick, Foteini Hassiotou, and Erik J. Veneklaas 2018

SYSTEMS BIOLOGY, MOLECULAR BIOLOGY, AND GENE REGULATION

DkMyb4 Is a Myb Transcription Factor Involved in Proanthocyanidin Biosynthesis in Persimmon Fruit. Takashi Akagi, Ayako Ikegami, Tomoyuki Tsujimoto, Shozo Kobayashi, Akihiko Sato, Atsushi Kono, and Keizo Yonemori 2028

The Phytochrome-Interacting Factor PIF7 Negatively Regulates DREB1 Expression under Circadian Control in Arabidopsis. Satoshi Kidokoro, Kyonoshin Maruyama, Kazuo Nakashima, Yoshuki Imura, Yoshiiro Narusaka, Zabta K. Shinwari, Yuriko Osakabe, Yasunari Fujita, Junya Mizoi, Kazuo Shinozaki, and Kazuko Yamaguchi-Shinozaki 2046

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A T9G Mutation in the Prototype TATA-Box TCACCATATATAG Determines Nucleosome Formation and Synergy with Upstream Activator Sequences in Plant Promoters. Amol Ranjan, Suaiya A. Ansari, Rakesh Srivastava, Shrikant Mantri, Mehar H. Asif, Samir V. Sawant, and Rakesh Tuli 2174

CORRECTIONS


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[W] Indicates Web-only data.
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