

On the Cover: *Alocasia macrorrhiza* is known as the giant taro and is a member of the Arum family. The plant was originally domesticated in Southeast Asia and spread eastward to the Pacific islands where it became a staple crop. They are one of the four main species cultivated by Austronesians primarily as a source of starch. The leaves and stems are edible if cooked thoroughly to remove the raphides which are toxic. Image by Mike Blatt.

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- [^{OPEN}] HSP101 Interacts with the Proteasome and Promotes the Clearance of Ubiquitylated Protein Aggregates. *Fionn McLoughlin, Minsoo Kim, Richard S. Marshall, Richard D. Vierstra, and Elizabeth Vierling*
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3,5-triazines label and inhibit ascorbate peroxidases (APXs) in plants, revealing that triazine herbicides and their degradation products block APXs and reduce photosynthesis. 1848
- [^{OPEN}] Metabolic Alterations in the Enoyl-CoA Hydratase 2 Mutant Disrupt Peroxisomal Pathways in Seedlings. *Ying Li, Yu Liu, and Bethany K. Zolman*
Changes in enoyl-CoA hydratase2 activity result in metabolic alterations that influence seedling development through a toxic effect. 1860
- [^{OPEN}] Gene Networks Underlying Cannabinoid and Terpenoid Accumulation in Cannabis. *Jordan J. Zager, Iris Lange, Narayanan Srividya, Anthony Smith, and B. Markus Lange*
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- [^{OPEN}] Role of Polysaccharides in Diatom *Thalassiosira pseudonana* and its Associated Bacteria in Hydrocarbon Presence. *Manoj Kamalanathan, Meng-Hsuen Chiu, Hernando Bacosa, Kathy Schwehr, Shih-Ming Tsai, Shawn Doyle, Alexandra Yard, Savannah Mapes, Carlos Vasequez, Laura Bretherton, Jason B. Sylvan, Peter Santschi, Wei-Chun Chin, and Antonietta Quigg*
Polysaccharide synthesis in diatoms influences the surrounding bacterial community in the presence and absence of hydrocarbons. 1898
- [^{OPEN}] A Genome-Scale Metabolic Model of Soybean (*Glycine max*) Highlights Metabolic Fluxes in Seedlings. *Thiago Batista Moreira, Rahul Shaw, Xinyu Luo, Oishik Ganguly, Hyung-Seok Kim, Lucas Gabriel Ferreira Coelho, Chun Yue Maurice Cheung, and Thomas Christopher Rhys Williams*
A genome-scale metabolic model of soybean identifies shifts in flux distribution during seedling growth. 1912
- [^{OPEN}] Carbohydrate Metabolism and Signaling in Squash Nectaries and Nectar Throughout Floral Maturation. *Erik M. Solhaug, Elizabeth Johnson, and Clay J. Carter*
Squash nectaries break down starch to synthesize nectar sugars, with some contribution coming directly from the phloem, whereas trehalose metabolism appears to be important for nectar secretion. 1930
- [^{CC-BY}] Leaf Energy Balance Requires Mitochondrial Respiration and Export of Chloroplast NADPH in the Light. *Sanu Shameer, R. George Ratcliffe, and Lee J. Sweetlove*
Metabolic modeling reveals why mitochondrial respiration and chloroplast NAD(P)H export are required in illuminated leaves. 1947
- [^{OPEN}] The Plastid Lipase PLIP1 Is Critical for Seed Viability in *diacylglycerol acyltransferase1* Mutant Seed. *Karanbir Aulakh and Timothy P. Durrett*
*Global transcript profiling of developing *Arabidopsis* *dgat1* seed reveals a critical role for the plastid lipase PLIP1 in providing polyunsaturated substrates for triacylglycerol synthesis.* 1962
- [^{OPEN}] *Sclerotinia sclerotiorum* Circumvents Flavonoid Defenses by Catabolizing Flavonol Glycosides and Aglycones. *Jingyuan Chen, Chhana Ullah, Michael Reichelt, Jonathan Gershenzon, and Almuth Hammerbacher*
*Catabolism of flavonols contributes to *S. sclerotiorum* virulence during infection of *Arabidopsis*.* 1975

[OPEN] A Neighboring Aromatic-Aromatic Amino Acid Combination Governs Activity Divergence between Tomato Phytoene Synthases. *Hongbo Cao, Hongmei Luo, Hui Yuan, Mohamed A. Eissa, Theodore W. Thannhauser, Ralf Welsch, Yu-Jin Hao, Lailiang Cheng, and Li Li*

A lack of neighboring aromatic-aromatic amino acid combination in one of the PSY core structures is responsible for the weak carotenogenic activity of tomato fruit-specific PSY1.

1988

CELL BIOLOGY

[OPEN] CRK2 Enhances Salt Tolerance by Regulating Callose Deposition in Connection with PLD α 1. *Kerri Hunter, Sachie Kimura, Anne Rokka, Huy Cuong Tran, Masatsugu Toyota, Jyrki P. Kukkonen, and Michael Wrzaczek*

The receptor-like kinase CRK2 adopts PLD α 1-dependent stress-induced subcellular localization patterns, regulating callose deposition at plasmodesmata and enhancing salt tolerance in Arabidopsis

2004

[OPEN] AtERO1 and AtERO2 Exhibit Differences in Catalyzing Oxidative Protein Folding in the Endoplasmic Reticulum. *Fenggui Fan, Yini Zhang, Guozhong Huang, Qiao Zhang, Chih-chen Wang, Lei Wang, and Dongping Lu*

Both AtERO1 and AtERO2 play essential roles in oxidative protein folding in the endoplasmic reticulum, but AtERO1 may serve as the primary sulfhydryl oxidase relative to AtERO2

2022

[OPEN] Extensive Posttranscriptional Regulation of Nuclear Gene Expression by Plastid Retrograde Signals. *Guo-Zhang Wu, Etienne H. Meyer, Si Wu, and Ralph Bock*

Translational and posttranslational regulation play a crucial role in the plastid gene expression pathway of retrograde signaling and supports a function of GUN1 in plastid proteostasis.

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[OPEN] Cortical Cell Diameter Is Key To Energy Costs of Root Growth in Wheat. *Tino Colombi, Anke Marianne Herrmann, Pernilla Vallenback, and Thomas Keller*

Genotypic diversity and phenotypic plasticity in root cortical cell diameter play key roles in reducing energy costs of root growth under high soil penetration resistance.

2049

Brassinosteroids Act as a Positive Regulator of Photoprotection in Response to Chilling Stress. *Pingping Fang, Mengyu Yan, Cheng Chi, Mengqi Wang, Yanhong Zhou, Jie Zhou, Kai Shi, Xiaojian Xia, Christine H. Foyer, and Jingquan Yu*

Brassinosteroids positively regulate photoprotection via the redox-PGR5-mediated pathway in response to chilling stress in tomato.

2061

GENES, DEVELOPMENT AND EVOLUTION

[OPEN] The PLATZ Transcription Factor GL6 Affects Grain Length and Number in Rice. *Ahong Wang, Qingqing Hou, Lizhen Si, Xuehui Huang, Jianghong Luo, Danfeng Lu, Jingjie Zhu, Yingying Shanguan, Jiashun Miao, Yifan Xie, Yongchun Wang, Qiang Zhao, Qi Feng, Congcong Zhou, Yan Li, Danlin Fan, Yiqi Lu, Qilin Tian, Zixuan Wang, and Bin Han*

The plant-specific protein GL6 determines grain length and spikelet number in rice by affecting cell proliferation through gene expression regulation via the RNAPIII transcription machinery

2077

CRISPR-Based Assessment of Gene Specialization in the Gibberellin Metabolic Pathway in Rice. *Xiao Chen, Xuejian Tian, Lan Xue, Xiaohui Zhang, Sihai Yang, M. Brian Traw, and Ju Huang*

CRISPR-based assessment reveals nonredundant functions and diversified evolution of enzymes in the gibberellin metabolic pathway in rice.

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Maize Dek44 Encodes Mitochondrial Ribosomal Protein L9 and Is Required for Seed Development. *Weizwei Qi, Lei Lu, Shengchan Huang, and Rentao Song*

A newly identified maize mitochondrial ribosomal protein that is highly conserved in monocots and only accumulates in kernels affects mitochondrial function and kernel development.

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Dek40 Encodes a PBAC4 Protein Required for 20S Proteasome Biogenesis and Seed Development. Guifeng Wang, Wei Fan, Mingyan Ou, Xuwei Wang, Hongli Qin, Fan Feng, Yulong Du, Jiacheng Ni, Jihua Tang, Rentao Song, and Gang Wang

The PBAC4 chaperone encoded by *Dek40* in maize influences 20S core protease biogenesis and is required for 26S proteasome function and seed development. 2120

^[OPEN]The Soybean Sugar Transporter GmSWEET15 Mediates Sucrose Export from Endosperm to Early Embryo. Shoudong Wang, Kengo Yokosho, Runze Guo, James Whelan, Yong-Ling Ruan, Jian Feng Ma, and Huixia Shou

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^[CC-BY]DSP1 and DSP4 Act Synergistically in Small Nuclear RNA 3' End Maturation and Pollen Growth. Xuepiao Pu, Chunmei Meng, Weili Wang, Siyu Yang, Yuan Chen, Qingjun Xie, Bin Yu, and Yunfeng Liu

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Accumulation of photodamaged PSII core proteins enables retrograde signaling via the stress hormone salicylic acid and its signaling components, EDS1 and PAD4. 2182

^[OPEN]Abscisic Acid Coordinates Dose-Dependent Developmental and Hydraulic Responses of Roots to Water Deficit. Miguel A. Rosales, Christophe Maurel, and Philippe Nacry

Similar bell-shaped dose-dependent effects of water deficit (WD) and ABA on root development and hydraulics as well as analysis of ABA synthesis and response mutants suggest that ABA acts as a coordinator of root responses to WD. 2198

^[OPEN]WRKY18 and WRKY53 Coordinate with HISTONE ACETYLTRANSFERASE1 to Regulate Rapid Responses to Sugar. Qingshuai Chen, Xiyu Xu, Di Xu, Haisen Zhang, Cankui Zhang, and Gang Li

Multiple WRKY transcription factors activate the expression of sugar-responsive genes by physically interacting with HISTONE ACETYLTRANSFERASE1 and promoting acetylation of histone 3 lysine 27. 2212

^[OPEN]*Phytophthora infestans* RXLR Effectors Target Parallel Steps in an Immune Signal Transduction Pathway. Yajuan Ren, Miles Armstrong, Yetong Qi, Hazel McLellan, Cheng Zhong, Bowen Du, Paul R.J. Birch, and Zhendong Tian

Two *P. infestans* effectors, PexRD2 and Pi22926, target two parallel MAP3K proteins in the same signal transduction pathway to promote *P. infestans* colonization. 2227

^[OPEN]The Photoperiodic Flowering Time Regulator FKF1 Negatively Regulates Cellulose Biosynthesis. Ning Yuan, Vimal Kumar Balasubramanian, Ratan Chopra, and Venugopal Mendu

Light regulates cellulose biosynthesis through FKF1, a specific blue light receptor and photoperiodic flowering time regulator. 2240

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[OPEN] PuHSFA4a Enhances Tolerance To Excess Zinc by Regulating Reactive Oxygen Species Production and Root Development in *Populus*. Haizhen Zhang, Jingli Yang, Wenlong Li, Yingxi Chen, Han Lu, Shicheng Zhao, Dandan Li, Ming Wei, and Chenghao Li

PuHSFA4a, which activates the antioxidant program and root development-related genes, directly targets *PuGSTU17* and *PuPLA₂*, positively regulating excess Zn tolerance in *Populus ussuriensis* roots.

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[OPEN] Differential N-end Rule Degradation of RIN4/NOI Fragments Generated by the AvrRpt2 Effector Protease. Kevin Goslin, Lennart Eschen-Lippold, Christin Naumann, Eric Linster, Maud Sorel, Maria Klecker, Rémi de Marchi, Anne Kind, Markus Wirtz, Justin Lee, Nico Dissmeyer, and Emmanuelle Graciet

Analysis of RIN4/NOI fragments, which are released after cleavage by the bacterial effector protease AvrRpt2, reveals a role for the N-end rule in NOI domain protein degradation, but not RIN4.

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[OPEN] MdUGT88F1-Mediated Phloridzin Biosynthesis Regulates Apple Development and *Valsa* Canker Resistance. Kun Zhou, Lingyu Hu, Yangtiansu Li, Xiaofeng Chen, Zhijun Zhang, Bingbing Liu, Pengmin Li, Xiaoqing Gong, and Fengwang Ma

MdUGT88F1-mediated phloridzin biosynthesis is critical for apple development and *Valsa* canker resistance by regulating the interplay between cell wall deposition and accumulation of SA and ROS.

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A New Barley Stripe Mosaic Virus Allows Large Protein Overexpression for Rapid Function Analysis. Cheuk A. and Houde M.

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