December

Journal of Agronomy and Crop Science
A strategy of ideotype development for heat-tolerant wheat
Smi Ullah, Helen Bramley, Tariq Mahmood, Richard Trethowan
Version of Record online: 29 November 2019

Nature Structural and Molecular Biology
The mitochondrial gate reveals its secrets **pp1083 - 1085**
Doron Rapaport
doi:10.1038/s41594-019-0346-3

The structure and oxidation of the eye lens chaperone αA-crystallin **pp1141 - 1150**
Christoph J. O. Kaiser, Carsten Peters, Philipp W. N. Schmid, Maria Stavropoulou, Juan Zou *et al.*
doi:10.1038/s41594-019-0332-9
Oligomers of human αA-crystallin are characterized structurally via a hybrid approach, combining cryo-EM, cross-linking/mass spectrometry, NMR and modeling, providing insight into their dynamic behavior and heterogeneity and revealing that oxidized oligomers can also act as chaperones.

Cryo-EM structure of the mitochondrial protein-import channel TOM complex at near-atomic resolution **pp1158 - 1166**
Kyle Tucker & Eunyong Park
doi:10.1038/s41594-019-0339-2
High-resolution cryo-EM structures of the core TOM complex from Saccharomyces cerevisiae, as dimeric and tetrameric assemblies, provide new insights into the mechanism of protein translocation into mitochondria.

Nature

Article | 04 December 2019
Developmental ROS individualizes organismal stress resistance and lifespan

A subpopulation of *Caenorhabditis elegans*, in which there is a naturally occurring transient increase in reactive oxygen species during early development, exhibits increased stress resistance, improved redox homeostasis and prolonged lifespan, which are linked to a global decrease in level of the histone mark H3K4me3.

E. coli bacteria engineered to eat carbon dioxide
Feat could turn bacteria into biological factories for energy and even food.

CRISPR tool modifies genes precisely by copying RNA into the genome
The ultimate goal of genome editing is to be able to make any specific change to the blueprint of life. A ‘search-and-replace’ method for genome editing takes us a giant leap closer to this ambitious goal.

JBC

Harnessing evolutionary diversification of primary metabolism for plant synthetic biology

Plant Organelle Genome Replication
By:Morley, SA (Morley, Stewart A.)[1,3] ; Ahmad, N (Ahmad, Niaz)[2] ; Nielsen, BL (Nielsen, Brent L.)[1]
View Web of Science ResearcherID and ORCID
PLANTS-BASEL Volume: 8 Issue: 10 Article Number: 358 DOI: 10.3390/plants8100358 Published: OCT 2019
:Review

Jones RD, Enam C, Ibarra R, Borror HR, Mostoller KE, Fredrickson EK, Lin J, Chuang E, March Z, Shorter J, Ravid T, Kleiger G, Gardner RG.
The extent of Ssa1/Ssa2 Hsp70 chaperone involvement in nuclear protein quality control degradation varies with the substrate.
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A History of Molecular Chaperone Structures in the Protein Data Bank.
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Cui Y, Wang M, Yin X, Xu G, Song S, Li M, Liu K, Xia X.
OsMSR3, a Small Heat Shock Protein, Confers Enhanced Tolerance to Copper Stress in <i>Arabidopsis thaliana</i>.
Int J Mol Sci. 2019 Dec 3;20(23).PMID: 31816902 [PubMed - in process]

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Human Î±B-crystallin discriminates between aggregation-prone and function-preserving variants of a client protein.
Biochim Biophys Acta Gen Subj. 2019 Dec 5;:129502.PMID: 31812542 [PubMed - as supplied by publisher]

Zhu Y, Gao H, Lu M, Hao C, Pu Z, Guo M, Hou D, Chen LY, Huang X.
Melatonin-Nitric Oxide Crosstalk and Their Roles in the Redox Network in Plants.
Int J Mol Sci. 2019 Dec 9;20(24). PMID: 31818042 [PubMed - in process]

Montagna MT, Diella G, Triggiano F, Caponio GR, Giglio O, Caggiano G, Ciaula AD, Portincasa P.
Chocolate, "Food of the Gods": History, Science, and Human Health.
Int J Environ Res Public Health. 2019 Dec 6;16(24). PMID: 31817669 [PubMed - in process]

Tran SL, Porrini C, Ramarao N.
Dr. NO and Mr. Toxic - the versatile role of nitric oxide.
Biol Chem. 2019 Dec 1;. [Epub ahead of print] PMID: 31811798 [PubMed - as supplied by publisher]

Zhu Y, Gao H, Lu M, Hao C, Pu Z, Guo M, Hou D, Chen LY, Huang X.
Melatonin-Nitric Oxide Crosstalk and Their Roles in the Redox Network in Plants.
Int J Mol Sci. 2019 Dec 9;20(24). PMID: 31818042 [PubMed - in process]

Trends in Plant Science

MAPK Signaling: Emerging Roles in Lateral Root Formation
Available Online 14 December 2019
Yunxia He, Xiangzong Meng

CRISPR-TSKO: A Tool for Tissue-Specific Genome Editing in Plants
Available Online 16 December 2019
Zahir Ali, Magdy M. Mahfouz, Shahid Mansoor

Adaptive Growth: Shaping Auxin-Mediated Root System Architecture
Available Online 13 December 2019
Guanghui Xiao, Yuzhou Zhang

Plant Cell & Environment

Deterioration of ovary plays a key role in heat stress-induced spikelet sterility in sorghum
Anuj Chiluwal, Raju Bheemanahalli, Vinutha Kanaganahalli, Dan Boyle, Ramasamy Perumal, Meghnath Pokharel, Halilou Oumarou, S.V. Krishna Jagadish
Version of Record online: 01 December 2019
Highly conserved early-morning-flowering mechanism helps sorghum to minimize negative impact of heat stress on pollen viability, while damage to ovary icreases heat stress induced spikelet sterility

High night temperature induced changes in grain starch metabolism alters starch, protein, and lipid accumulation in winter wheat
Somayanda M. Impa, Amaranatha R. Vennapusa, Raju Bheemanahalli, David Sabela, Dan Boyle, Harkamal Walia, S.V. Krishna Jagadish
Version of Record online: 01 December 2019
High night temperature-induced reduction in winter wheat grain-yields and starch accumulation is attributed to decreased transcript levels of AGPase and increased transcript levels of isoamylase III, alpha-, and beta-amylases

Plant Journal

Exploring the proteome associated with the mRNA encoding the D1 reaction center protein of Photosystem II in plant chloroplasts
Kenneth P. Watkins, Rosalind Williams-Carrier, Prakitchai Chotewutmontri, Giulia Friso, Marlene Teubner, Susan Belcher, Hannes Ruwe, Christian Schmitz-Linneweber, Klaas J. van Wijk, Alice Barkan
First Published: 02 December 2019

Physiologia Plantarum

Reduction in seed set upon exposure to high night temperature during flowering in maize

Yuanyuan Wang, Hongbin Tao, Ping Zhang, Xinfang Hou, Dechang Sheng, Beijing Tian, Pu Wang, Shoubing Huang

Nitric Oxide

A forty year journey: The generation and roles of NO in plants.

Kolbert Z, Barroso JB, Brouquisse R, Corpas FJ, Gupta KJ, Lindermayr C, **Loake** GJ, Palma JM, Petřivalský M, Wendehenne D, Hancock JT.
Nitric Oxide Volume 93, 1 December 2019, Pages 53-70

Nature Reviews Molecular Cell Biology **volume 21**,

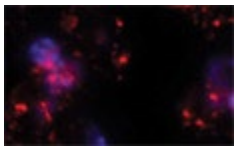
The functional universe of membrane contact sites
William A. Prinz, Alexandre Toulmay & Tamas Balla
pp7 - 24 | doi:10.1038/s41580-019-0180-9
Although organelles compartmentalize eukaryotic cells, they can communicate and integrate their activities by connecting at membrane contact sites (MCSs). The roles of MCSs in biology are becoming increasingly clear, with MCSs now known to function in intracellular signalling, lipid metabolism, membrane dynamics, organelle biogenesis and the cellular stress response.
Full Text | **PDF**

The molecular principles governing the activity and functional diversity of AAA+ proteins
Cristina Puchades, Colby R. Sandate & Gabriel C. Lander
pp43 - 58 | doi:10.1038/s41580-019-0183-6
AAA+ proteins are macromolecular machines that remodel a vast array of cellular substrates, including protein aggregates, macromolecular complexes and polymers. Recent advances in cryo-electron microscopy have enabled visualization of them while in action, leading to a better understanding of the mechanisms of engagement and processing of their diverse substrates.
Full Text | **PDF**

Stress signaling and cellular proliferation reverse the effects of mitochondrial mistranslation

Nicola Ferreira, Kara L Perks, Giulia Rossetti, Danielle L Rudler, Laetitia A Hughes, Judith A Ermer, Louis H Scott, Irina Kuznetsova, Tara R Richman, Vinod K Narayana, Laila N Abudulai, Anne-Marie J Shearwood, Henrietta Cserne Szappanos, Dedreia Tull, George C Yeoh, Livia C Hool, Aleksandra Filipovska, Oliver Rackham

EMBO J (2019) 38: e102155 | First Published: 13 November 2019



Error-prone mitochondrial translation induces a rescuing stress response, while hyper-accuracy causes dilated cardiomyopathy in mice by reducing protein producti

Nature Chemical Biology

 News & Views | 09 December 2019

Heat Shock Proteins: Dynamic Biomolecules to Counter Plant Biotic and Abiotic Stresses

ul Haq, Saeed; Khan, Abid; Ali, Muhammad; Khattak, Abdul Mateen; Gai, Wen-Xian; et al.

International Journal Of Molecular Sciences

Due to the present scenario of climate change, plants have to evolve strategies to survive and perform under a plethora of biotic and abiotic stresses, which restrict plant productivity. Maintenance of plant protein functional conformati...

[Molecular glue concept solidifies]

Molecular-glue-mediated proximity-induced degradation now allows unprecedented therapeutic targeting of previously undruggable proteins. Structures showing how aryl-sulfonamides mediate recruitment of the splicing factor RBM39 to the E3 $CRL4^{DCAF15}$ broaden the mechanistic principles by which molecular glues target ubiquitylation.

News & Views | 09 December 2019

[Processing for destruction]

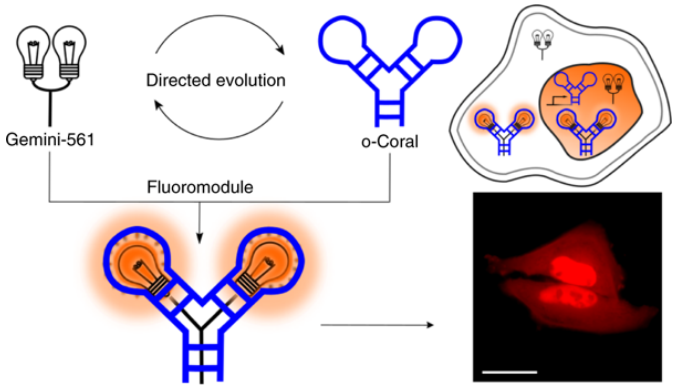
Phenotypic screening is an engine of discovery for bioactive small molecules and can unravel novel mechanisms and pathways controlling cellular

[CPSF3-dependent pre-mRNA processing as a druggable node in AML and Ewing's sarcoma]

The RNA endonuclease CPSF3 was identified as the cellular efficacy target of the small molecule JTE-607, revealing pre-mRNA processing as a vulnerability in cancers such as Ewing's sarcoma that are characterized by aberrant transcription.

[Targeting the interaction of AIMP2-DX2 with HSP70 suppresses cancer development]

The cellular stability of an oncogenic factor, AIMP2-DX2, is increased via association with HSP70. Interference with this interaction by a small-molecule compound promotes ubiquitin-mediated degradation of AIMP2-DX2 and reduces cancer cell growth.



[A dimerization-based fluorogenic dye-aptamer module for RNA imaging in live cells]

A dimerization-induced self-quenching fluorescent dye, Gemini-561, and its aptamer o-Coral were developed for imaging mRNAs in living cells with improved brightness and photostablility.

Mini reviewFull text access

Mitochondria: A Microcosm of Darwinian Competition
Bryan L. Gitschlag, Maulik R. Patel Pages R1316-R1318
Review articleFull text access

Development of Wild and Cultivated Plants under Global Warming Conditions
Rebecca Lippmann, Steve Babben, Anja Menger, Carolin Delker, Marcel Quint Pages R1326-R1338
Short communicationOpen access

A Genome-wide Screen Reveals that Reducing Mitochondrial DNA Polymerase Can Promote Elimination of Deleterious Mitochondrial Mutations
Ason C.-Y. Chiang, Eleanor McCartney, Patrick H. O'Farrell, Hansong Ma Pages 4330-4336.e3

Plant Journal

The coordinated action of PPR4 and EMB2654 on each intron half mediates *trans*-splicing of *rps12* transcripts in plant chloroplasts
Kwanuk Lee, Su Jung Park, Catherine Colas des Francs-Small, Michael Whitby, Ian Small, Hunseung Kang
Pages: 1193-1207 | First Published: 23 August 2019
Despite the crucial role of pentatricopeptide repeat (PPR) proteins in organellar RNA metabolism and plant development, the functions of many PPR proteins remain unknown. Here, we show that the PPR4 and EMB2654 bind to the 5′ end of *rps12* intron 1b and the 3′ end of *rps12* intron 1a to juxtapose the two intron halves for the efficient *trans*-splicing of *rps12* intron 1, which is essential for chloroplast biogenesis and plant development.

AtHB23 participates in the gene regulatory network controlling root branching, and reveals differences between secondary and tertiary roots
María F. Perotti, Pamela A. Ribone, Julieta V. Cabello, Federico D. Ariel, Raquel L. Chan Pages: 1224-1236 | First Published: 23 August 2019
Significance Statement
The homeodomain-leucine zipper transcription factor AtHB23 exhibits different expression patterns in primary and secondary roots. It directly represses *LBD16*, and induces *LAX3* expression in primary and secondary roots, respectively, and it is directly regulated by ARF7/19 to become a molecular link between ARF7/19 and *LAX3*. The research results hint that different genetic programs govern the formation of lateral root primordia from the main or secondary roots.
The Spotlight is on Lang Pan, Qin Yu, Heping Han, Lingfeng Mao, Alex Nyporko, LongJiang Fan, Lianyang Bai, and Stephen Powles. Their article **"Aldo-keto Reductase Metabolizes Glyphosate and Confers Glyphosate Resistance in Echinochloa colona"** has an Altmetrics score of 26 and 21 mentions in the past week.

Molecular Cell
Dynamic Imaging of RNA in Living Cells by CRISPR-Cas13 Systems
Liang-Zhong Yang, Yang Wang, Si-Qi Li, Run-Wen Yao, ... Ling-Ling Chen Pages 981-997.e7

Plant Journal

Seydina I. Diop, Oliver Subotic, Alejandro Giraldo-Fonseca, Manuel Waller, Alexander Kirbis, Anna Neubauer, Giacomo Potente, Rachel Murray-Watson, Filip Boskovic, Zoe Bont, Zsofia Hock, Adam C. Payton, Daniël Duijsings, Walter Pirovano, Elena Conti, Ueli Grossniklaus, Stuart F. McDaniel, Péter Szövényi

Significance Statement *Marchantia polymorpha* has recently become a prime model for cellular, evolutionary-developmental, synthetic biological, and evolutionary investigations with highly fragmented genomic resources (genome draft published in 2017; nearly 3000 scaffolds). To this end, we generated a pseudomolecule-scale genome assembly of *M. polymorpha*, which will help to advance plant science by making comparative genome structure analysis and classical genetic mapping approaches feasible.

GUN1 influences the accumulation of NEP-dependent transcripts and chloroplast protein import in Arabidopsis cotyledons upon perturbation of chloroplast protein homeostasis

Luca Tadini, Carlotta Peracchio, Andrea Trotta, Monica Colombo, Ilaria Mancini, Nicolaj Jeran, Alex Costa, Franco Faoro, Milena Marsoni, Candida Vannini, Eva-Mari Aro, Paolo Pesaresi

Significance Statement Correct chloroplast development and function require co-ordinated regulation of chloroplast and nuclear gene expression. Here, we propose that GUN1, a main player of chloroplast-to-nucleus retrograde communication, influences NEP-dependent transcript accumulation during cotyledon greening and also intervenes in chloroplast protein import.

Plant organellar RNA editing: what 30 years of research has revealed

Ian D. Small, Mareike Schallenberg-Rüdinger, Mizuki Takenaka, Hakim Mireau, Oren Ostersetzer-Biran

Significance Statement The basic principle of molecular biology, in which RNAs faithfully follow the primary sequences of the genes from which they are transcribed, has been challenged by RNA editing, which creates RNA products that differ from their DNA templates, and affects many of the mtRNAs in plants. In accordance with the huge progress made concerning the characterization of the molecular basis of RNA editing in plants, we report here on major discoveries on RNA editing in plant organelles, since first documented 30 years ago.

Hyperspectral imaging combined with machine learning as a tool to obtain high-throughput plant salt-stress phenotyping

Xuping Feng, Yihua Zhan, Qi Wang, Xufeng Yang, Chenliang Yu, Haoyu Wang, ZhiYu Tang, Dean Jiang, Cheng Peng, Yong He

Significance Statement Developing high-throughput phenotyping technology using large datasets is important for large-scale screening programs. The deep-learning method implemented with hyperspectral images allows the monitoring of dynamic differences of plant morphological and physiological measurements in a non-destructive manner, which helps to accelerate plant breeding processes.

Chua A, Fitzhenry L, Daly CT.
Sorting the Wheat From the Chaff: Programmed Cell Death as a Marker of Stress Tolerance in Agriculturally Important Cereals.
Front Plant Sci. 2019;10:1539. PMID: 31850031 [PubMed]

Cho C, Jang J, Kang Y, Watanabe H, Uchihashi T, Kim SJ, Kato K, Lee JY, Song JJ.
Structural basis of nucleosome assembly by the Abo1 AAA+Â ATPase histone chaperone.
Nat Commun. 2019 Dec 17;10(1):5764. PMID: 31848341 [PubMed - in process]

Assenza S, Sassi AS, Kellner R, Schuler B, De Los Rios P, Barducci A.
Efficient conversion of chemical energy into mechanical work by Hsp70 chaperones.
Elife. 2019 Dec 17;8. [Epub ahead of print] PMID: 31845888 [PubMed - as supplied by publisher]

Parey K, Haapanen O, Sharma V, KÃ¶feler H, ZÃ¼llig T, Prinz S, Siegmund K, Wittig I, Mills DJ, Vonck J, KÃ¼hlbrandt W, Zickermann V.
High-resolution cryo-EM structures of respiratory complex I: Mechanism, assembly, and disease.
Sci Adv. 2019 Dec;5(12):eaax9484.MID: 31844670 [PubMed - in process]

Kohli SK, Khanna K, Bhardwaj R, Abd Allah EF, Ahmad P, Corpas FJ.
Assessment of Subcellular ROS and NO Metabolism in Higher Plants: Multifunctional Signaling Molecules.
Antioxidants (Basel). 2019 Dec 12;8(12). PMID: 31842380 [PubMed]

Plant Breeding

REVIEW ARTICLES

Breeding for Fusarium head blight resistance in wheat—Progress and challenges
Maria Buerstmayr, Barbara Steiner, Hermann Buerstmayr
Version of Record online: 12 December 2019

E-life
Structure of a mitochondrial ATP synthase with bound native cardiolipin
Alexander Mühleip, Sarah E McComas, Alexey Amunts
The atomic model of a mitochondrial ATP synthase dimer underlies functions of its specific protein constituents and boundary cardiolipins.
Different from the rest
The photosynthetic organism *Euglena gracilis* has an unusual form of the enzyme ATP synthase that can help reconstruct the evolution of this molecular machine.

Plant Cell and Envronment

Present knowledge and controversies, deficiencies, and misconceptions on nitric oxide synthesis, sensing, and signaling in plants
Review José León, Álvaro Costa-Broseta
First Published: 19 July 2019
Research on nitric oxide (NO) in plants has relied largely on the use of pharmacological approaches, which suffers from low specificity, and analytical techniques that do not allow the precise and quantitative determination of endogenous NO. Better tools, including specific sensors and improved proteomics of posttranslational modifications, as well as genetic approaches will help to identify the components, processes, and mechanisms involved in NO-triggered regulation of plant biology.

Thioredoxin *h2* contributes to the redox regulation of mitochondrial photorespiratory metabolism
Paula da Fonseca-Pereira, Paulo V.L. Souza, Liang-Yu Hou, Saskia Schwab, Peter Geigenberger, Adriano Nunes-Nesi, Stefan Timm, Alisdair R. Fernie, Ina Thormählen, Wagner L. Araújo, Danilo M. Daloso Pages: 188-208 | First Published: 04 August 2019

Overall, our results suggest that TRX *h*2 plays an important role in the redox regulation of metabolism and that the lack of TRX *h2* leads to a reprograming of the mitochondrial photorespiratory metabolism in *Arabidopsis thaliana*.

Volume 12, Issue 9, 2 September 2019, Pages 1203-1210

Resource Article

Whole-Plant Live Imaging of Reactive Oxygen Species

YosefFichman[1]GadMiller[2]RonMittler[13]

https://doi.org/10.1016/j.molp.2019.06.003

T. Kazama, M. Okuno, Y. Watari, S. Yanase, C. Koizuka, Y. Tsuruta, H. Sugaya, A. Toyoda, T. Itoh, N. Tsutsumi, K. Toriyama, N. Koizuka, S. Arimura. 2019. Curing cytoplasmic male sterility via TALEN-mediated mitochondrial genome editing. *Nature Plants*. DOI: 10.1038/s41477-019-0459-z
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Avelange-Macherel MH, Rolland A, Hinault MP, Tolleter D, Macherel D.
The Mitochondrial Small Heat Shock Protein HSP22 from Pea is a Thermosoluble Chaperone Prone to Co-Precipitate with Unfolding Client Proteins.
Int J Mol Sci. 2019 Dec 21;21(1). PMID: 31877784 [PubMed - in process]

Mühlhofer M, Berchtold E, Stratil CG, Csaba G, Kunold E, Bach NC, Sieber SA, Haslbeck M, Zimmer R, Buchner J.
The Heat Shock Response in Yeast Maintains Protein Homeostasis by Chaperoning and Replenishing Proteins.
Cell Rep. 2019 Dec 24;29(13):4593-4607.e8.PMID: 31875563 [PubMed - in process]

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Activity-Based Sensing for Site-Specific Proteomic Analysis of Cysteine Oxidation.
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Expression of protein synthesis elongation factors in winter wheat and oat in response to heat stress.
J Plant Physiol. 2019 Jul 29;240:153015. PMID: 31377481 [PubMed - as supplied by publisher]