RESERCH HIGHLIGHTS

190 Our choices from the recent literature

NEWS AND VIEWS

192 Biomaterials: Metabolites empowering minerals
Ingrid M Weiss
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193 Protein dynamics: Bridging the gap
Gary W Daughdrill
► Article p214

194 Screening: Low-fat worms on drugs
Bridget K Wagner
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195 Biofuels: Chimeric synthetic pathways
Jens Nielsen
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BRIEF COMMUNICATIONS

197 Glycolytic intermediates induce amorphous calcium carbonate formation in crustaceans

The mechanisms and molecules involved in controlling biomineral formation remain unclear, though several proteins have been implicated in the process. Examination of crayfish now surprisingly points to upregulated glycolytic metabolites as playing a critical role in stabilizing amorphous calcium carbonate.
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ON THE COVER

Intrinsic disorder
p21 makes a stretch
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Metabolic engineering
Cooking with gas
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ON THE COVER

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COVER IMAGE
The mechanisms by which different species control biomineralization remain mysterious. Sato et al. now demonstrate that, surprisingly, small glycolytic metabolites stabilize amorphous calcium carbonate in crayfish and possibly other crustaceans in a regulated manner. In this cover image, a crayfish stands on top of a scanning electron microscope image of a gastrolith, or ‘stomach stone’. The fibrous materials visible are chitin, and the small particles are amorphous calcium carbonate.

Cover art by Erin Dewalt, based on an original microscopy image provided by Toshihiro Kogure and an original photograph from ©iStockphoto.com/Olga Demchishina.

Brief Communication, p197; News & Views, p192

Brief Communications
Glycolytic intermediates induce amorphous calcium carbonate formation in crustaceans

The mechanisms and molecules involved in controlling biomineral formation remain unclear, though several proteins have been implicated in the process. Examination of crayfish now surprisingly points to upregulated glycolytic metabolites as playing a critical role in stabilizing amorphous calcium carbonate.
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200 Navigating the kinome
J T Metz, E F Johnson, N B Soni, P J Merta, L Kifle & P J Hajduk
Assisted by 3,800 chemical bioactivities, a bioinformatic analysis explores the inter-relatedness of over 170 kinases and generates a kinase interaction map based on sequence and ligand-binding activity that challenges the robustness of drug interaction networks.

203 Characterization of a selective inhibitor of the Parkinson’s disease kinase LRRK2
X Deng, N Dzamko, A Prescott, P Davies, Q Liu, Q Yang, J-D Lee, M P Patricelli, T K Nomanbhoy, D R Alessi & N S Gray
A potent and selective inhibitor of the kinase LRRK2 identified using an in vitro ATP-site competition binding assay also inhibits the G2019S mutant, implicated in Parkinson’s disease, as well as the regulatory feedback loop where LRRK2 is phosphorylated and binds 14-3-3 protein.

ARTICLES

206 A whole-organism screen identifies new regulators of fat storage
G A Lemieux, J Liu, N Mayer, R J Bainton, K Ashrafi & Z Werb
A screen for compounds that alter fat content in C. elegans identifies a novel agonist of an AMP-activated kinase pathway that reduces fat storage as well as implicates the transcription factor K08F8.2 as a regulator of fat metabolism.

214 Intrinsic disorder mediates the diverse regulatory functions of the Cdk inhibitor p21
Y Wang, J C Fisher, R Mathew, L Ou, S Otieno, J Sublet, L Xiao, J Chen, M F Roussel & R W Kriwacki
NMR reveals the dynamic stretching ability of the subdomain LH of the intrinsically disordered p21, providing a physical basis for the binding and functional diversity in its cell cycle regulatory role as a modulator of Cdk-cyclin complexes.
Enzyme mechanism as a kinetic control element for designing synthetic biofuel pathways
B B Bond-Watts, R J Bellerose & M C Y Chang

As metabolic reactions are often in equilibrium, product sequestration is often used to drive engineered pathways forward. For n-butanol, however, this is not possible; instead, introducing kinetic barriers for backwards reactions significantly increases product yield.

Uptake of unnatural trehalose analogs as a reporter for Mycobacterium tuberculosis

The use of synthetic analogs to explore substrate promiscuity during trehalose incorporation into the mycobacterial cell wall yields a fluorescent probe that can be used to examine M. tuberculosis cell biology and detect this harmful pathogen within macrophages.

Structural basis for RNA trimming by RNase T in stable RNA 3’-end maturation
Y-Y Hsiao, C-C Yang, C L Lin, J L J Lin, Y Duh & H S Yuan

RNase T is a 3’-to-5’ exonuclease involved in RNA maturation pathways. Biochemical and three-dimensional structures of RNase T in complex with single- or double-stranded DNA reveal mechanisms of substrate selection and catalysis by this nuclease.