COVER IMAGE

The mechanisms by which plants dissipate excess energy in photosynthetic antennae have remained unclear. New research on an antenna-like protein purified from the cyanobacterium Synechocystis PCC 6803 provides evidence that the energy absorbed by chlorophylls is dissipated via its direct transfer to the S1 energy state of β-carotene. Cover art by Erin Dewalt, based on an electron micrograph image of Synechocystis PCC 6803 provided by Lenka Bučinská. Article, p287

EDITORIAL

237 Double-blind peer review

BOOKS & ARTS

239 Translational research: Drug discovery from the inside
Reviewed by Derek Lowe

RESEARCH HIGHLIGHTS

240 Our choices from the recent literature

NEWS AND VIEWS

242 Photosynthesis: Dissipating energy by carotenoids
Diana Kirilovsky
Article p287

243 Carbohydrates: Translation from sticky to sweet
Michela G Tonetti
Article p266

244 GPCRs: Heterodimer-specific signaling
Marc Parmentier
Article p271

PERSPECTIVE

246 Regulation of the oncoprotein Smoothened by small molecules
Hayley J Sharpe, Weiru Wang, Rami N Hannoush & Frederic J de Sauvage
This Perspective discusses recent advances in understanding the structural and pharmacological properties of the downstream Hedgehog pathway effector Smoothened. Small molecule agonists and antagonists of Smo could be used as potential therapeutics.
**BRIEF COMMUNICATION**

256 The structure of SpnF, a standalone enzyme that catalyzes [4 + 2] cycloaddition
C D Fage, E A Isiorho, Y Liu, D T Wagner, H Liu & A T Keatinge-Clay

Establishing the existence of a Diels-Alderase—an enzyme that catalyzes a concerted [4 + 2] cycloaddition—is made easier by a crystal structure of SpnF, which, along with computational and biochemical analysis, should enable mechanistic investigations.

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**ARTICLES**

259 An enzymatic [4+2] cyclization cascade creates the pentacyclic core of pyrroindomycins
Z Tian, P Sun, Y Yan, Z Wu, Q Zheng, S Zhou, H Zhang, F Yu, X Jia, D Chen, A Mándi, T Kurtán & W Liu

The discovery of two new types of enzymes that act in tandem within spirotetramate biosynthetic pathway to catalyze [4+2] cycloadditions offers new opportunities for mechanistic investigations of potential Diels-Alderas.

266 Arginine-rhamnosylation as new strategy to activate translation elongation factor P
J Lassak, E C Keilhauer, M Fürst, K Wuichet, J Gödeke, A L Starosta, J-M Chen, L Søgaard-Andersen, J Rohr, D N Wilson, S Häussler, M Mann & K Jung

N-linked glycosylation of a conserved arginine in the translation elongation factor EF-P by a newly discovered rhamnosyltransferase EarP is needed to rescue ribosomal stalling at polyproline-encoding sequences in β-proteobacteria and other species.

271 Dual agonist occupancy of AT₁R-α₂C-AR heterodimers results in atypical Gₛ-cAMP-PKA signaling

Technologies that bias GPCR expression for formation of heterodimers show that, when heterodimerized, α₂C-AR and AT-1R exhibit atypical Gₛ-cAMP-PKA signaling upon ligand costimulation compared to either parent receptor expressed alone and mimic activation associated with arterial hypertension.

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Pharmacological folding chaperones act as allosteric ligands of Frizzled4

Several GPCRs have ligands that act as pharmacological chaperones that rescue function of mutated receptors. This formed the basis of a screening strategy to identify new ligands for Frizzled4 that act allosterically at an effector domain to inhibit β-catenin signaling.

Mechanism of photoprotection in the cyanobacterial ancestor of plant antenna proteins
H Staleva, J Komenda, M K Shukla, V Šlouf, R Kaña, T Polívka & R Sobotka

Light-harvesting complexes (LHCs) manage energy flux into photosynthesis and dissipate excess light energy. The demonstration of dissipative energy transfer from chlorophyll-α to β-carotene in cyanobacterial high light-inducible proteins provides a mechanistic model for similar processes in LHCs.

Compounds targeting disulfide bond forming enzyme DsbB of Gram-negative bacteria

A screen for compounds that inhibit disulfide bond formation in β-galactosidase in Escherichia coli found inhibitors of the membrane enzyme DsbB. Given the importance of DsbB in bacterial virulence, the inhibitors are potentially useful as antibacterials.

CORRECTIONS

Errata and corrigenda
CORRECTIONS

Table of contents


In the version of this table of contents initially printed, the description of the Books & Arts article was incorrect. It should read “Translational research: Drug discovery from the inside.” This information is correct in the HTML and PDF versions of the table of contents.