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O. Brandman and T. Meyer

Optical Switches for Remote and Noninvasive Control of Cell Signaling
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From Signals to Patterns: Space, Time, and Mathematics in Developmental Biology
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Structure and Molecular Mechanism of a Nucleobase-Cation-Sympporter Family Transporter
S. Weyand et al.
The structure of a membrane transporter in an open state suggests that in- and out-facing cavities reciprocally open and close coordinated by two transmembrane segments.
10.1126/science.1164440

ASTRONOMY
The Fermi Gamma-Ray Space Telescope Discovers the Pulsar in the Young Galactic Supernova Remnant CTA 1
G. Kanbach et al.
The Fermi Space Telescope has detected a gamma-ray pulsar associated with a young supernova remnant, implying that such stars may be unidentified gamma-ray sources.
10.1126/science.1165572

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CELL BIOLOGY
Detection of GTP-Tubulin Conformation in Vivo Reveals a Role for GTP Remnants in Microtubule Rescues A. Dimitrov, M. Quesnoit, S. Moutel, I. Cantaloube, C. Poüs, F. Perez
GTP-bound tubulin is found at microtubule ends in living cells and also within microtubules, where it may promote repolymerization and avert microtubule collapse.
10.1126/science.1165401

ASTRONOMY
Observation of Pulsed γ-Rays Above 25 GeV from the Crab Pulsar with MAGIC
The MAGIC Collaboration
The MAGIC telescope has detected higher-energy, pulsed gamma rays from the Crab pulsar and a threshold suggesting that they are emitted from the outer magnetosphere.
10.1126/science.1164718

GEOCHEMISTRY
The Miller Volcanic Spark Discharge Experiment A. P. Johnson et al.
Reanalysis of archived samples of an experiment simulating production of organic molecules in volcanic gases by lightning shows that they contain many amino acids. >> Science Podcast

GENETICS
Conservation and Rewiring of Functional Modules Revealed by an Epistasis Map in Fission Yeast A. Roguev et al.
Comparison of genetic wiring in two types of yeast reveals that protein complexes are conserved, but the interactions between them can change radically between species.

PHYSICS
Current-Induced Spin-Wave Doppler Shift V. Vlaminck and M. Bailleul
A current-induced shift in the frequency of propagating spin waves provides a simple technique to probe spin-polarized currents in engineering spintronic devices. >> Perspective p. 386

CHEMISTRY
Catalytic Conversion of Biomass to Monofunctional Hydrocarbons and Targeted Liquid-Fuel Classes E. L. Kunkes et al.
A set of two reactors, one that breaks down biomass sugars and a second that directs chain formation, can synthesize various hydrocarbon fuels.
REPORTS CONTINUED...

CHEMISTRY
Accurate Temperature Imaging Based on Intermolecular Coherences in Magnetic Resonance
G. Galiana, R. T. Branco, E. R. Jenista, W. S. Warren
The shift of water nuclear magnetic resonance peaks relative to those of lipids provides an accurate thermometer of internal temperatures, for example, in a mouse.

CHEMISTRY
Molecular Layering of Fluorinated Ionic Liquids at a Charged Sapphire (0001) Surface
M. Mezger et al.
Reflections of high-energy x-rays reveal that when in contact with a sapphire surface, and likely other surfaces, an ionic liquid forms alternating layers of cations and anions.

MATERIALS SCIENCE
Evolution of Block Copolymer Lithography to Highly Ordered Square Arrays
C. Tang et al.
The addition of hydrogen bonding units to two block copolymers leads to a template with square patterns that can be used for manufacturing integrated circuits.

PLANETARY SCIENCE
The Extreme Kuiper Belt Binary 2001 QW₃₂
J.-M. Petit et al.
Two small, weakly bound objects in the outer solar system orbit each other more than 100,000 kilometers apart, a distance that challenges ideas for how such binaries form.

GENETICS
Species-Specific Transcription in Mice Carrying Human Chromosome 21
M. D. Wilson et al.
An aneuploid mouse carrying a human chromosome shows that genetic sequence can dominate epigenetic, cellular, and organismal effects in determining transcriptional regulation and gene expression.

BIOCHEMISTRY
Surface Sites for Engineering AllostERIC Control in Proteins
J. Lee et al.
Two allosterically regulated proteins can be engineered to interact so that when light activates one, it triggers the enzymatic output (dihydrofolate reductase) of the other.

BIOCHEMISTRY
A Stochastic Single-Molecule Event Triggers Phenotype Switching of a Bacterial Cell
P. J. Choi, L. Cai, K. Frieda, X. S. Xie
A stochastic process, in which a regulatory repressor dissociates from either one or two DNA sites, determines which of two phenotypes is seen in genetically identical bacteria.

BIOCHEMISTRY
Remeasuring the Double Helix
R. S. Mathew-Fenn, R. Das, P. A. B. Harbury
Pieces of DNA in solution are much softer than DNA under tension and unexpectedly stretch large amounts over several helical turns.

NEUROSCIENCE
Relation Between Obesity and Blunted Striatal Response to Food Is Moderated by TaqIA A1 Allele
E. Stice, S. Spoor, C. Bohon, D. M. Small
Individuals whose reward centers of the brain respond sluggishly after eating prefer calorie-dense foods, which may account for their greater propensity to gain weight. >> Science Podcast

CELL BIOLOGY
Phosphorylation Networks Regulating JNK Activity in Diverse Genetic Backgrounds
C. Bakal et al.
Data from an RNA interference screen, combined with genetic interaction analysis, allow construction of a comprehensive kinase cellular signaling network in Drosophila.

CELL BIOLOGY
Higher-Order Cellular Information Processing with Synthetic RNA Devices
M. N. Win and C. D. Smolke
The intrinsic ribosome of a simple RNA-based Boolean logic device that can be engineered into cells is activated when it is bound by two particular molecules. >> Perspective p. 387

IMMUNOLOGY
Innate Immunity in Caenorhabditis elegans Is Regulated by Neurons Expressing NPR-1/GPCR
K. L. Styer et al.
In the worm Caenorhabditis elegans, sensory neurons surprisingly can inhibit innate immune responses, in part through the mitogen-activated protein kinase (MAPK) signaling pathway.
VILIP1 interacts with P2X2 receptors in dendrites.

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Science 322 (5900), 341-465.