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Gene Regulation

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MicroRNAs Make Big Impression in Disease After Disease 1782

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Cooking Up the Solar System From the Right Ingredients
New Piece of the Solar System Puzzle Fits In
What Was a ‘Wet and Warm’ Early Mars Really Like?
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COVER
The many layers of gene regulation in a eukaryotic cell, envisioned as a video game. Transcription in the nucleus (green circle) proceeds to translation in the cytoplasm via genome topology, polymerase pausing, microRNA repression, RNA splicing, and riboswitch regulation. See the special section beginning on page 1781.

Illustration: Carin L. Cain

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MATERIALS SCIENCE

Stretchable and Foldable Silicon Integrated Circuits
D.-H. Kim et al.
High-performance, bendable, and stretchable electronic devices are fabricated on an elastic plastic substrate by placing the critical electronic components in the neutral bending plane.

10.1126/science.1154367

APPLIED PHYSICS

Silica-on-Silicon Waveguide Quantum Circuits
A. Politi et al.
Quantum circuits—in which individual photons interfere, entangle, and form logic gates—have been realized on silicon chips.

10.1126/science.1155441

BIOCHEMISTRY

Reconstitution of Pilus Assembly Reveals a Bacterial Outer Membrane Catalyst
M. Nishiyama, T. Ishikawa, H. Rechsteiner, R. Glockshuber
The cell-free formation of the protruberant pilus of a pathogenic bacteria is accelerated by a protein that catalyzes supramolecular assembly without input of cellular energy.

10.1126/science.1154994

GENETICS

Rare Structural Variants Disrupt Multiple Genes in Neurodevelopmental Pathways in Schizophrenia
T. Walsh et al.
Patients with schizophrenia carry multiple small deletions and duplications in their DNA that are associated nonrandomly with neuronal signaling and brain development pathways.

10.1126/science.1155174

LETTERS

The Last Inventor of the Telephone
J. Schmidhuber

Thinking Outside the Reef
E. L. Peterson, M. Beger, Z. T. Richards

Putting Ant-Acacia Mutualisms to the Fire
R. Cochard and D. Agosti Response T. M. Palmer et al.

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J. Lehrer; 1763

Artscience Creativity in the Post-Google Generation
D. Edwards, reviewed by J. Labinger

Victorian Popularizers of Science Designing Nature for New Audiences
B. Lightman, reviewed by P. J. Pauly

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The Planet Debate Continues
M. V. Sykes

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REPORTS

ASTROPHYSICS

Magnetar-Like Emission from the Young Pulsar in Kes 75
F. P. Gavriil et al.
A pulsar exhibits x-ray bursts like that seen only in magnetars, which have ultrahigh magnetic fields, implying that neutron stars exhibit a continuum of magnetic activity.
Rats can learn the rules governing simple sequences of stimuli and then unexpectedly can generalize these rules to new situations. R. A. Murphy, E. Mondragón, V. A. Murphy

**Rule Learning by Rats**

**NEUROSCIENCE**

Electric Fields Due to Synaptic Currents Sharpen Excitatory Transmission 1845

S. Sylantiev et al.

The electrical field set up by currents within the synaptic cleft can influence diffusion of negatively charged neurotransmitters, such as glutamate, and prolong excitatory events.

**Aversive Learning Enhances Perceptual and Cortical Discrimination of Indistinguishable Odor Cues**

W. Li, J. D. Howard, T. B. Parrish, J. A. Gottfried

After association of negative stimuli to one of a pair of initially indistinguishable odors, human participants learn to tell the two odors apart and show altered brain representations.

**Discrimination of Indistinguishable Odor Cues**

**NEUROSCIENCE**

Insect Odorant Receptors Are Molecular Targets of the Insect Repellent DEET 1838

M. Ditzen, M. Pellegrino, L. B. Vosshall

The widely used insect repellent DEET acts by inhibiting olfactory neurons that respond to odors such as those that attract insects to their hosts.

**Insect Odorant Receptors Are Molecular Targets of the Insect Repellent DEET**

**NEUROSCIENCE**

The Transition from Stiff to Compliant Materials in Squid Beaks 1816

A. Miserez, T. Schneberk, C. Sun, F. W. Zok, J. H. Waite

The squid beak, sharp and hard only at the tip, exhibits a chemical gradient that tailors its mechanical properties to prevent damage to the attached soft muscle tissue.

**Self-Assembly of Large and Small Molecules into Hierarchically Ordered Sacs and Membranes**

**CHEMISTRY**

Holes in a boron nitride surface ringed by in-plane dipoles form a nanometer-scale pore network with a trapping potential that can hold weakly adsorbed molecules.

**Surface Trapping of Atoms and Molecules with Dipole Rings**

**CHEMISTRY**

Mixing of a high–molecular weight polymer with a low–molecular weight peptide amphiphile instantly forms repairable membrane sacs large enough to encapsulate cells.

**Determining Transition-State Geometries in Liquids Using 2D-IR**

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**NEUROSCIENCE**
Multilayered mechanisms control various aspects of gene expression.

PERSPECTIVE: Silent Assassin—Oncogenic Ras Directs Epigenetic Inactivation of Target Genes
X. Cheng
Oncogenic Ras directs a program that epigenetically silences genes that inhibit tumorigenesis.

PERSPECTIVE: NFAT Is Well Placed to Direct Both Enhancer Looping and Domain-Wide Models of Enhancer Function
P. N. Cockerill
Inducible intrachromosomal looping between the tumor necrosis factor-α (TNF-α) gene promoter and two NFAT-dependent enhancers activates TNF-α gene expression.

PERSPECTIVE: SRC-3 Transcription-Coupled Activation, Degradation, and the Ubiquitin Clock—Is There Enough Coactivator to Go Around in Cells?
D. M. Lonard and B. W. O’Malley
The critical factor in estrogen-dependent growth of breast cancer cells appears to be the abundance of the coactivator protein SRC-3.