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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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

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Dynamics of Saturn’s South Polar Vortex
U. A. Dyudina et al.
Observations from Cassini show that the cloud vortex at Saturn’s south pole shares some features with hurricanes (such as an eye wall), but forms by a different mechanism.

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.
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PHYSICS

Sr Lattice Clock at 1 × 10⁻¹⁶ Fractional Uncertainty by Remote Optical Evaluation with a Ca Clock
A. D. Ludlow et al.

Two clocks based on optical transitions in single trapped ions, set 4 kilometers apart, are able to keep time within a fractional error of 1 × 10⁻¹⁶, better than the standard atomic clock.

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PHYSICS

Frequency Ratio of Al⁺ and Hg⁺ Single-Ion Optical Clocks; Metrology at the 17th Decimal Place
T. Rosenband et al.

Precise measurements of the frequency ratio of two optical clocks indicate that the fine-structure constant is fine and constant to an uncertainty of 10⁻¹⁷.

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CHEMISTRY

Self-Assembly of Large and Small Molecules into Hierarchically Ordered Sacs and Membranes
R. M. Capito et al.

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

MATERIALS SCIENCE

The Transition from Stiff to Compliant Materials in Squid Beaks
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.

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CHEMISTRY

Determining Transition-State Geometries in Liquids Using 2D-IR
J. F. Cahoon, K. R. Sawyer, J. P. Schlegel, C. B. Harris

Tracking vibrational modes through a transition state by spectroscopy reveals an iron compound’s thermal ligand rearrangement, which was previously too fast to monitor.

CHEMISTRY

Surface Trapping of Atoms and Molecules with Dipole Rings
H. Dil et al.

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.

MOLECULAR BIOLOGY

Nutritional Control of Reproductive Status in Honeybees via DNA Methylation
R. Kucharski, J. Maleszka, S. Foret, R. Maleszka

Epigenetic modifications that involve methylation cause female honeybee larvae to become queens rather than workers when they are fed royal jelly.

STRUCTURAL BIOLOGY

The Flavivirus Precursor Membrane-Envelope Protein Complex: Structure and Maturation
L. Li et al.

Structure of the Immature Dengue Virus at Low pH
I-M. Yu et al.

Dengue and West Nile viruses mature when the envelope protein precursor is cleaved at low pH, and then the cleavage product dissociates outside the cell, allowing infection.

NEUROSCIENCE

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

NEUROSCIENCE

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.

NEUROSCIENCE

Electric Fields Due to Synaptic Currents Sharpen Excitatory Transmission
S. Sylantyev 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.

NEUROSCIENCE

Rule Learning by Rats
R. A. Murphy, E. Mondragón, V. A. Murphy

Rats can learn the rules governing simple sequences of stimuli and then unexpectedly can generalize these rules to new situations.

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I. S. Levine
Perfectionism can diminish productivity, undermine job satisfaction, and damage work relationships.

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P. Gosling and B. Noordam
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R. Freeman
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