Optical or electrical pulses can rapidly locate and manipulate the spin of a single electron in a quantum dot or of a nitrogen vacancy in diamond. Such techniques represent progress toward solid-state quantum computing (see pages 349 and 352).

Image: Peter Allen and Jesse Berezovsky
REVIEW

MEDICINE
Qinghaosu (Artemisinin): The Price of Success 330
N. J. White

BREVIA

ECOLOGY
The Movement of Aquatic Mercury Through Terrestrial Food Webs 335
D. A. Cristol et al.
Industrial mercury in a contaminated river can spread beyond the immediate area to nearby terrestrial ecosystems through food web connections.

CELL BIOLOGY
Reconstitution of Contractile FtsZ Rings in Liposomes
M. Osawa, D. E. Anderson, H. P. Erickson
A tubulin homolog from prokaryotes can, without other proteins, assemble into rings around liposomes and constrict, suggesting a primordial cell division mechanism.
10.1126/science.1157560

RESEARCH ARTICLES

CLIMATE CHANGE
Phytoplankton Calcification in a High-CO₂ World
M. D. Iglesias-Rodriguez et al.
Experiments show that a coccolithophore grows better at elevated carbon dioxide levels, in contrast to predictions for most plankton, and is already increasing in abundance.
>> Science Express Perspective by V. J. Fabry

MEDICINE
The Global Circulation of Seasonal Influenza A (H3N2) Viruses
C. A. Russell et al.
Recent seasonal flu strains constantly evolved in overlapping epidemics in Asia, then erupted to periodically sweep the world, ending in South America 6 to 18 months later.
>> News story p. 310

MATHEMATICS
Generalized Voice-Leading Spaces
C. Callender, I. Quinn, D. Tymoczko
A geometric representation of Western music theory, in which distance represents similarity of chord types, reveals relations among diverse musical concepts.
>> Perspective p. 328

PHYSICS
Picosecond Coherent Optical Manipulation of a Single Electron Spin in a Quantum Dot
J. Berezovsky et al.
A series of ultrafast optical pulses can be used to rotate the spin of a single electron in a quantum dot by a specified angle within a few picoseconds.

BIOCHEMISTRY

Reconstitution of Pilus Assembly Reveals a Bacterial Outer Membrane Catalyst
M. Nishiyama, T. Ishikawa, H. Rechsteiner, R. Glockshuber

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.

BIOCHEMISTRY

Structural Basis of Toll-Like Receptor 3 Signaling with Double-Stranded RNA
L. Liu et al.

Two horseshoe-shaped monomers of an innate immunity receptor bind to viral RNA through carboxyl-terminal dimerization, ultimately triggering inflammation.

NEUROSCIENCE

The Antidepressant Fluoxetine Restores Plasticity in the Adult Visual Cortex
J. F. Maya Vetencourt et al.

An antidepressant drug increases growth factors and reduces inhibitory activity in the visual cortex of adult rats, thereby restoring the plasticity seen only during development.

CELL BIOLOGY

Wnt5a Control of Cell Polarity and Directional Movement by Polarized Redistribution of Adhesion Receptors
E. S. Witze et al.

A developmental signal causes clustering of membrane-associated proteins (including its receptor) at one end of the cell, marking the cell’s polarity for directional movement. >> Perspective p. 327

NEUROSCIENCE

A Model for Neuronal Competition During Development
C. D. Deppmann et al.

Modeling and experiments show that neurons survive during development when neuronal sensitization to survival signals outweighs antagonistic signals for cell death.

MEDICINE

Recapitulation of IVIG Anti-Inflammatory Activity with a Recombinant IgG Fc
R. M. Anthony et al.

By identifying the sugar modifications responsible for the therapeutic, anti-inflammatory effect of immunoglobulin, an improved recombinant version can be formulated.

CHEMISTRY

Atomlike, Hollow-Core–Bound Molecular Orbitals of C₆₀
M. Feng, J. Zhao, H. Petek

Scanning tunneling microscopy and density functional theory reveal that C₆₀ acts as a superatom in which its unoccupied orbitals are atomlike and delocalized in aggregates.

PHYSICS

Coherent Dynamics of a Single Spin Interacting with an Adjustable Spin Bath
R. Hanson et al.

Simulations successfully show how the spin of a nitrogen vacancy in diamond is coupled to those of surrounding nitrogen impurities and how coherence between them is lost.

APPLIED PHYSICS

Chaotic Dirac Billiard in Graphene Quantum Dots
L. A. Ponomarenko et al.

Graphene quantum dots vary with their size: Large dots form molecular-scale transistors, intermediate ones show quantum chaos, and the smallest act as single-electron detectors. >> Perspective p. 324

GENETICS

The Chemical Genomic Portrait of Yeast: Uncovering a Phenotype for All Genes
M. E. Hillenmeyer et al.

Exposing yeast cultures to an extensive variety of small molecules and environmental stresses indicates that almost all genes have a demonstrable biological function.

BIOCHEMISTRY

Divergence of Quaternary Structures Among Bacterial Flagellar Filaments
V. E. Galkin et al.

Flagellar proteins from two bacterial species diverge in their coiled-coil regions; only one triggers an immune response, which may have driven their evolutionary divergence.

REPORTS CONTINUED...
Financial trading can wreak havoc on physiology.

**SCIENCE NOW**

www.sciencenow.org  DAILY NEWS COVERAGE

Living in a World of Unfamiliar Voices
A woman with a lifelong inability to recognize voices is a medical mystery.

Bad Day for the Dow? Blame Hormones
Market activity is reflected in financial traders’ testosterone and cortisol levels.

Case Closed for Free Will?
The unconscious brain makes choices several seconds before the conscious mind knows about it.

**SCIENCE SIGNALING**

www.sciencesignaling.org

Modeling cell signaling.

**SCIENCE CAREERS**

www.sciencecareers.org/career_development

CAREER RESOURCES FOR SCIENTISTS

A Matter of Policy
B. Vastag
Fellowships are available that let scientists contribute to local and national policies.  >> Editorial p. 289

Tooling Up: On Headhunters
D. Jensen
Recruiters may seem to offer some advantages, but early-career scientists should still keep their heads.

Home Stretch to Graduation
E. Pain
Submitting your Ph.D. dissertation isn’t always a relief.

From the Archives: What’s Love Got to Do With It?
I. S. Levine
Our Mind Matters expert studies the pros and cons of scientists tying the knot.