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COVER

Waiting for a vaccination to curb a meningitis epidemic under way in Koudougou district, Burkina Faso, in March. An affordable new meningitis vaccine in the works promises to prevent, not just control, these frequent epidemics. See page 1710.

Image: Monique Berlier/MVP-PATH

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BIOCHEMISTRY
Crystal Structure of the Termination Module of a Nonribosomal Peptide Synthetase
A. Tanovic, S. A. Samel, L.-O. Essen, M. A. Marahiel
A large enzyme complex assembles peptide natural products without ribosomal participation by successive catalytic steps at the end of a flexible, substrate-loaded arm.
10.1126/science.1159850

CHEMISTRY
Measurement of the Distribution of Site Enhancements in Surface-Enhanced Raman Scattering
Y. Fang, N.-H. Seong, D. D. Dlott
The distribution of electric field–enhancing sites on a nanostructured substrate is measured by using the enhanced field to damage those sites.
10.1126/science.1159499

ASTRONOMY
Properties of Gamma-Ray Burst Progenitor Stars
P. Kumar, R. Narayan, J. L. Johnson
Analysis of the x-ray afterglow of intense gamma-ray bursts shows that the bursts result from consumption of the outer part of a dense star and define the star’s rotation rate.
10.1126/science.1159003

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Quantum State Engineering and Precision Metrology
J. Ye, H. J. Kimble, H. Katori

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Serotonin Modulates Behavioral Reactions to Unfairness
M. J. Crockett et al.
Individuals with low levels of brain serotonin are less likely to accept an unfair offer of money from other players in a laboratory game.

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Deep Drilling into the Chesapeake Bay Impact Structure
G. S. Gohn et al.
Drill cores from the Chesapeake Bay impact crater reveal that the impact moved huge blocks of country rock, trapped salty pore water, and still affects microbial communities.

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Dislocation Mean Free Paths and Strain Hardening of Crystals
B. Devincre, T. Hoc, L. Kubin
Simulations of the motions of atomic dislocations in a face-centered cubic metal allow these dynamics to be related to the metal’s bulk strength and deformation. >> Perspective p. 1729

MATERIALS SCIENCE
Ordered Mesoporous Materials from Metal Nanoparticle–Block Copolymer Self-Assembly
S. C. Warren et al.
A polymer and platinum nanoparticles stabilized with a ligand form large lamellar or inverse hexagonal structures that can be fused to create porous platinum-carbon composites.

ASTRONOMY
Very-High-Energy Gamma Rays from a Distant Quasar: How Transparent Is the Universe?
The MAGIC Collaboration
Observation of gamma rays from a quasar 5 billion light-years away implies that the background light in the universe is consistent with surveys of stars and galaxies.

CHEMISTRY
The Role of Interstitial Sites in the Ti3d Defect State in the Band Gap of Titania
S. Wendt et al.
Scanning tunneling microscope data and calculations show that near-surface titanium sites, not bridging oxygen vacancies, determine the useful electronic properties of TiO2.
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CHEMISTRY
Tryptophan-Accelerated Electron Flow Through Proteins
C. Shih et al.
A tryptophan residue placed between a donor and acceptor in a protein acts as a relay and accelerates long-distance electron transfer by more than a factor of 100.
>> Perspective p. 1730

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A Phyleggetic Study of Birds Reveals Their Evolutionary History
S. J. Hackett et al.
Nuclear DNA sequences of 19 loci from 169 bird species lead to a revised phylogenetic tree of avian evolution, in which several well-accepted orders are not monophyletic.
>> News story p. 1716; Science Podcast

ECOLOGY
A Significant Upward Shift in Plant Species Optimum Elevation During the 20th Century
J. Lenoir, J. C. Gégout, P. A. Marquet, P. de Ruffray, H. Brisse
A 100-year survey shows that the optimal elevations for growth of plant species in European temperate forests have shifted upward by about 30 meters per decade. >> Science Podcast

DEVELOPMENTAL BIOLOGY
Polarization of the C. elegans Embryo by RhoGAP-Mediated Exclusion of PAR-6 from Cell Contacts
D. C. Anderson, J. S. Gill, R. M. Cinalli, J. Nance
Exclusion of a regulatory protein from cell-cell contacts in the developing worm allows it to direct the assembly of an asymmetrical cytoskeleton in preparation for gastrulation.

DEVELOPMENTAL BIOLOGY
FGF-Dependent Mechanosensory Organ Patterning in Zebrafish
A. Nechiporuk and D. W. Raible
A fish sensory organ develops when a wave of migrating primordial cells cyclically deposits rosettes of differentiated cells under the influence of fibroblast growth factor.

CELL BIOLOGY
β-Arrestin–Mediated Localization of Smoothened to the Primary Cilium
J. J. Kovacs et al.
β-arrestin, which has several known roles in signaling systems, also links a key receptor to a motor protein so that the receptor can be transported to cilia for sensing environmental cues.
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MOLECULAR BIOLOGY
Both Catalytic Steps of Nuclear Pre-mRNA Splicing Are Reversible
C.-K. Tseng and S.-C. Cheng
The transesterification splicing reactions performed on RNA by the spliceosome protein complex in eukaryotic cells are reversible.

VIROLOGY
Virus Attenuation by Genome-Scale Changes in Codon Pair Bias
J. R. Coleman et al.
Altering the frequency of the adjacent codons in the poliovirus genome results in an attenuated virus that could form the basis of a vaccine. >> News story p. 1709

GENETICS
Paleo-Eskimo mtDNA Genome Reveals Matrilineal Discontinuity in Greenland
M. T. P. Gilbert et al.
Ancient human DNA sequences from Greenland suggest that the earliest inhabitants of the far north were from a lineage distinct from extant Native Americans and Eskimos.
Specifying digits.

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PERSPECTIVE: Uncoupling the Role of Sonic Hedgehog in Limb Development—Growth and Specification
P. Francis-West and R. Hill
Sonic hedgehog (Shh) is required for both proliferation and specification of cells in the developing limb bud.

PERSPECTIVE: p53 Brings a New Twist to the Smad Signaling Network
A. Atfi and R. Baron
Interactions between p53 and Smad proteins influence the responses to the TGF-β pathway, which may be important for progression of some types of cancer.

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S. Webb
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L. Laursen
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Choice of dietary fat affects intelligence.

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Pointing, herding, and life span of dogs linked to specific stretches of DNA.

Down Under, Fish Numbers Climb Up
Rapid recovery of a key species in Australia points to efficacy of fishing bans.

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