



## COVER

Tomato (*Solanum lycopersicum*) domestication and selection resulted in an explosion of different fruit shapes and sizes, as exemplified by heirloom varieties. Wild ancestors of tomatoes such as *S. pimpinellifolium*, the smallest fruit shown here, were round (middle row, second from left). See page 1527.

*Image: Kelly Krause/Science;*  
*photos: Esther van der Knaap*

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## SCIENCE EXPRESS

[www.sciencexpress.org](http://www.sciencexpress.org)

### PHYSICS

#### Coherent Dynamics of a Single Spin Interacting with an Adjustable Spin Bath

*R. Hanson, V. V. Dobrovitski, A. E. Feiguin, O. Gywat, D. D. Awschalom*

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.

10.1126/science.1155400

### CHEMISTRY

#### Gate-Variable Optical Transitions in Graphene

*F. Wang et al.*

Application of electrical biases to single or double layers of graphene change its infrared reflectivity, mimicking aspects of transistors and opening up optoelectronic applications.

10.1126/science.1152793

### CLIMATE CHANGE

#### Impact of Artificial Reservoir Water Impoundment on Global Sea Level

*B. F. Chao, Y. H. Wu, Y. S. Li*

Accounting for water impounded globally in artificial lakes that were filled during the past 80 years raises estimates of natural contributions to recent sea level.

10.1126/science.1154580



### 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.

10.1126/science.1153069

### 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.

>> *News story p. 1471*

10.1126/science.1153121

## REVIEW

### ANTHROPOLOGY

#### The Late Pleistocene Dispersal of Modern Humans in the Americas 1497

*T. Goebel, M. R. Waters, D. H. O'Rourke*

## BREVIA

### ECOLOGY

#### Predators Induce Cloning in Echinoderm Larvae 1503

*D. Vaughn and R. R. Strathmann*

Sand dollar larvae respond to mucus from fish predators by rapid asexual reproduction, producing an increased number of smaller individuals that may be less visible.

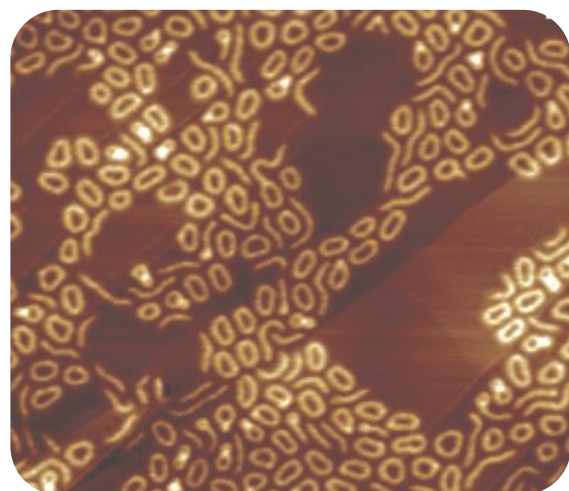


PHOTO CREDIT (TOP): GREG VOGEL, AD/CONTROLS

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### ASTRONOMY

#### Organic Molecules and Water in the Planet Formation Region of Young Circumstellar Disks 1504

*J. S. Carr and J. R. Najita*

Simple organic molecules and water are abundant in the inner disk of a star like our early Sun, implying that organic synthesis is occurring there.

>> *Perspective p. 1488*

### PHYSICS

#### Superconductivity in Hydrogen Dominant Materials: Silane 1506

*M. I. Erements, I. A. Trojan, S. A. Medvedev, J. S. Tse, Y. Yao*

Under pressure, the insulator silane (SiH<sub>4</sub>) transforms to a metallic phase and, at even higher pressures and low temperatures, becomes superconducting.

### PHYSICS

#### Energy Gaps and Kohn Anomalies in Elemental Superconductors 1509

*P. Aynajian et al.*

High-resolution neutron-scattering experiments reveal behavior in pure lead and niobium superconductors beyond that described by the standard theoretical framework.

>> *Perspective p. 1492*

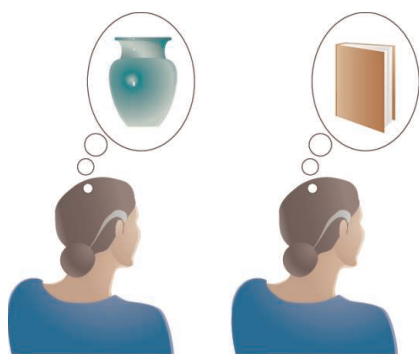
### CHEMISTRY

#### Synthesis of Macrocyclic Copolymer Brushes and Their Self-Assembly into Supramolecular Tubes 1512

*M. Schappacher and A. Deffieux*

A three-block polymer can generate long cyclic polymers in solution, which can be further functionalized to form polymer brushes and tubular assemblies.

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#### Splitting of the 520-Kilometer Seismic Discontinuity and Chemical Heterogeneity in the Mantle 1515

A. Saikia, D. J. Frost, D. C. Rubie

A reaction in calcium-rich rocks in Earth's mantle can explain a seismic signal that varies geographically and with depth, providing a means to map mantle compositions.

### GEOCHEMISTRY

#### The Chlorine Isotope Composition of Earth's Mantle 1518

M. Bonifacie et al.

Analysis of ocean basalts imply that Earth's mantle has a different chlorine isotopic ratio than crust or seawater, perhaps reflecting a late addition of material to Earth.

### PALEONTOLOGY

#### Caribbean Reef Development Was Independent of Coral Diversity over 28 Million Years 1521

K. G. Johnson, J. B. C. Jackson, A. F. Budd

An analysis of fossil and modern Caribbean corals shows that, for the last 28 million years, coral reef growth and persistence have not required high coral diversity.

### BIOCHEMISTRY

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C. Wasmer et al.

A structural model of a yeast prion shows that the amyloid fibrils form a left-handed  $\beta$  solenoid stabilized by hydrophobic and polar interactions and salt bridges.

### GENETICS

#### A Retrotransposon-Mediated Gene Duplication Underlies Morphological Variation of Tomato Fruit 1527

H. Xiao et al.

The gene causing elongated tomatoes arose from an unusual, transposon-mediated duplication that provided a new regulatory environment that increased its expression.

### GENETICS

#### Evidence for Karyogamy and Exchange of Genetic Material in the Binucleate Intestinal Parasite *Giardia intestinalis* 1530

M. K. Poxleitner et al.

The unusual lack of accumulated mutations in asexual *Giardia* can be explained by the exchange of plasmid DNA between its two nuclei during the cyst phase.

### MICROBIOLOGY

#### Direct Visualization of Horizontal Gene Transfer 1533

A. Babić et al.

Visualization of DNA exchange between two bacteria reveals that the process is highly efficient, is mediated by the pilus, and occurs about once per replication cycle.

### MEDICINE

#### Neurokinin 1 Receptor Antagonism as a Possible Therapy for Alcoholism 1536

D. T. George et al.

A drug that inhibits a neural signaling pathway linked to behavioral stress may be a useful therapy in preventing relapse in alcoholics.

### CELL BIOLOGY

#### Using Engineered Scaffold Interactions to Reshape MAP Kinase Pathway Signaling Dynamics 1539

C. J. Bashor, N. C. Helman, S. Yan, W. A. Lim

A yeast signaling pathway acquires new regulatory properties (such as adaptation) when additional protein-protein interaction sites are engineered into a scaffolding protein.

>> *Perspective p. 1489*

### NEUROSCIENCE

#### Synaptic Theory of Working Memory 1543

G. Mongillo, O. Barak, M. Tsodyks

Stronger synapses induced by calcium currents are responsible for working memory rather than the more metabolically expensive action potential firing, as had been thought. >> *Perspective p. 1495*

### SPECIAL FEATURE

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Water waster?

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Who was the first to improve on a widely used classic formula?



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From the Archives: The Drifter

*I. Chen*

After 2 years of wandering, Gary Ruvkun settled into a productive research career.

>> See also *Financing Your Research From Industry* feature, p. 1548



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