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
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.

REPORTS
ASTRONOMY
Organic Molecules and Water in the Planet Formation Region of Young Circumstellar Disks
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.

PHYSICS
Superconductivity in Hydrogen Dominant Materials: Silane
M. I. Eremets, I. A. Trojan, S. A. Medvedev, J. S. Tse, Y. Yao
Under pressure, the insulator silane (SiH₄) transforms to a metallic phase and, at even higher pressures and low temperatures, becomes superconducting.

PHYSICS
Energy Gaps and Kohn Anomalies in Elemental Superconductors
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.

CHEMISTRY
Synthesis of Macrocyclic Copolymer Brushes and Their Self-Assembly into Supramolecular Tubes
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.
SCIENCE

Solenoid with a Triangular Hydrophobic Core

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

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

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

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.

GEOCHEMISTRY

The Chlorine Isotope Composition of Earth’s Mantle

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

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

Amyloid Fibris of the HET-s(218–289) Prion Form a β Solenoid with a Triangular Hydrophobic Core

C. Wasmer et al.

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

GENETICS

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

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

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

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

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

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.

NEUROSCIENCE

Synaptic Theory of Working Memory

G. Mongillo, O. Barak, M. Tsoydk

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

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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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