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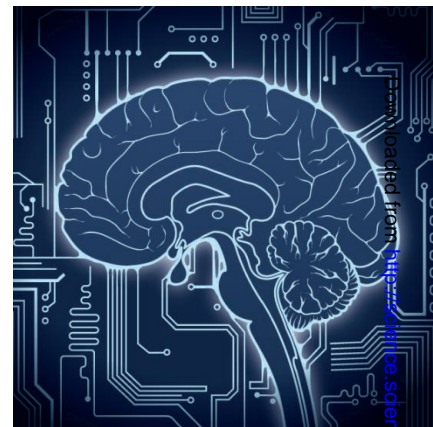
## SCIENCE PRIZE ESSAY

- 1164 Solving Complex Problems  
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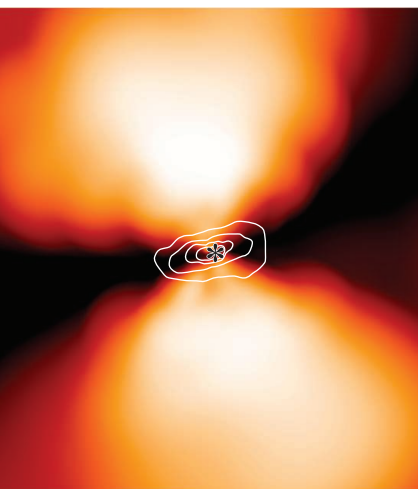
## COVER

Computer-generated models of three-dimensional nanostructures that were self-assembled from synthetic DNA strands called DNA bricks. A master collection defines a 1000-voxel "molecular canvas" with a 25-nanometer edge. By selecting subsets of bricks, *Ke et al.* constructed a panel of 102 distinct shapes with sophisticated surface features and intricate interior cavities and tunnels. These nanostructures may find applications ranging from biomedicine to nanoelectronics. See page 1177.

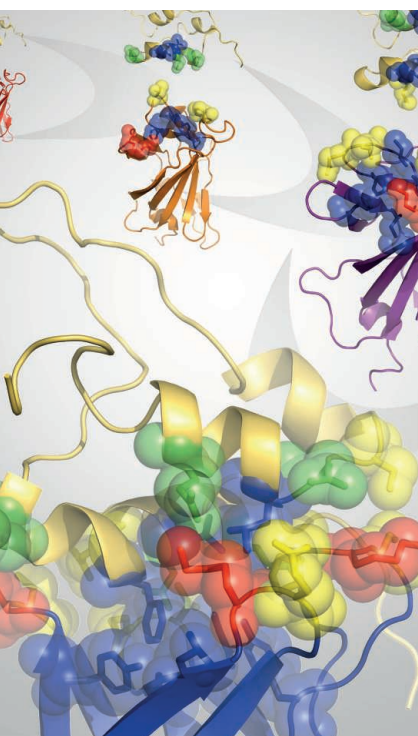
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- 1172 Ice-Sheet Response to Oceanic Forcing  
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## RESEARCH ARTICLES

- 1177 Three-Dimensional Structures Self-Assembled from DNA Bricks  
*Y. Ke et al.*  
Stepwise assembly of 32-nucleotide DNA "bricks" can create a wide variety of nanoscale objects.  
>> *Perspective p. 1159*
- 1183 A Reconciled Estimate of Ice-Sheet Mass Balance  
*A. Shepherd et al.*  
The mass balance of the polar ice sheets is estimated by combining the results of existing independent techniques.  
>> *News story p. 1138*

## REPORTS

- 1190 The Imprint of the Extragalactic Background Light in the Gamma-Ray Spectra of Blazars  
*M. Ackermann et al.*  
Gamma-ray spectra obtained with the Fermi Space Telescope constrain star formation and galaxy evolution over cosmic time.  
>> *Perspective p. 1160*
- 1193 Superconducting Dome in a Gate-Tuned Band Insulator  
*J. T. Ye et al.*  
Liquid gating tunes the carrier density in molybdenum disulfide, revealing unconventional superconductivity.
- 1196 Formation of Regular Satellites from Ancient Massive Rings in the Solar System  
*A. Crida and S. Charnoz*  
An analytical model suggests that the terrestrial and giant planets in the solar system formed moons through a similar process.
- 1199 Chemically and Geographically Distinct Solid-Phase Iron Pools in the Southern Ocean  
*B. P. von der Heyden et al.*  
The distribution and composition of fine-grained marine iron particles vary strongly with location.

- 1202 A Large-Scale Model of the Functioning Brain  
*C. Eliasmith et al.*  
Two-and-a-half million model neurons recognize images, learn via reinforcement, and display fluid intelligence.  
>> *Perspective p. 1156*
- 1206 Copy Number Variation of Multiple Genes at *Rhg1* Mediates Nematode Resistance in Soybean  
*D. E. Cook et al.*  
Resistance to a damaging disease of soybean is conferred by a cluster of linked genes present in multiple copies.
- 1209 An Exon Splice Enhancer Primes IGF2:IGF2R Binding Site Structure and Function Evolution  
*C. Williams et al.*  
Parental genetic conflict may have exploited changes in the coding of a protein loop in a growth factor receptor.
- 1214 Cytoplasmic ATP Hydrolysis Powers Transport of Lipopolysaccharide Across the Periplasm in *E. coli*  
*S. Okuda et al.*  
Transporting lipopolysaccharide from inside the bacterial cell to the surface requires multiple molecules of adenosine triphosphate.
- 1217 Direct Observation of Stalled Fork Restart via Fork Regression in the T4 Replication System  
*M. Manosas et al.*  
Bacterial DNA replication machinery is able to stall, regress, and then migrate past a DNA lesion in vitro.
- 1220 Progenitor and Terminal Subsets of CD8<sup>+</sup> T Cells Cooperate to Contain Chronic Viral Infection  
*M. A. Paley et al.*  
Chronic viral infections like HIV are kept in check by two functionally distinct types of T lymphocyte.
- 1225 Body Cues, Not Facial Expressions, Discriminate Between Intense Positive and Negative Emotions  
*H. Aviezer et al.*  
The body reveals what the face conceals.
- 1229 A Mutation in EGF Repeat-8 of Notch Discriminates Between Serrate/Jagged and Delta Family Ligands  
*S. Yamamoto et al.*  
A genetic screen identifies an extracellular motif in a conserved signaling receptor that confers ligand specificity.

## SCIENCEEXPRESS

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

Publication Ahead of Print

### The Closing Door of Climate Targets

T. F. Stocker

10.1126/science.1232468

### Bright and Dark Polar Deposits on Mercury: Evidence for Surface Volatiles

G. A. Neumann et al.

10.1126/science.1229764

### Evidence for Water Ice Near Mercury's North Pole from MESSENGER Neutron Spectrometer Measurements

D. J. Lawrence et al.

10.1126/science.1229953

>> [Science Podcast](#)

### Thermal Stability of Volatiles in the North Polar Region of Mercury

D. A. Paige et al.

10.1126/science.1231106

### Apatite <sup>4</sup>He/<sup>3</sup>He and (U-Th)/He Evidence for an Ancient Grand Canyon

R. M. Flowers and K. A. Farley

10.1126/science.1229390

### Crocodile Head Scales Are Not Developmental Units But Emerge from Physical Cracking

M. C. Milinkovitch et al.

10.1126/science.1226265

>> [Science Podcast](#)

### Natively Inhibited *Trypanosoma brucei* Cathepsin B Structure Determined by Using an X-ray Laser

L. Redecke et al.

10.1126/science.1229663

>> [News story p. 1136](#)

## SCIENCENOW

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

Highlights From Our Daily News Coverage

### Making a Flu Vaccine Without the Virus

A new influenza vaccine using only messenger RNA proves successful in animals.

[http://scim.ag/New\\_Vaccine](http://scim.ag/New_Vaccine)

### Putting Themselves to Sleep

A Valium-like compound produced by the brain could make some people super sleepy.

<http://scim.ag/Sleepy-People>

### Trees Living on the Edge

Forests are poorly equipped to deal with drought as the climate gets drier.

[http://scim.ag/Forests\\_Drought](http://scim.ag/Forests_Drought)

## SCIENCE SIGNALING

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

The Signal Transduction Knowledge Environment

**27 November issue:** <http://scim.ag/ss112712>

### RESEARCH ARTICLE: Regulation of Phosphatidylinositol-5-Phosphate Signaling by Pin1 Determines Sensitivity to Oxidative Stress

W.-J. Keune et al.

Increasing the abundance of the phospholipid PtdIns5P protects cells from oxidative stress.

### RESEARCH ARTICLE: Lack of the Phosphatase PTPN22 Increases Adhesion of Murine Regulatory T Cells to Improve Their Immunosuppressive Function

R. J. Brownlie et al.

### PODCAST

R. Zamojska and A. M. VanHook

Loss of the phosphatase PTPN22 enhances the functions of both effector and regulatory T cells.

### PERSPECTIVE: Remodeling a Tissue—Subtraction Adds Insight

J. D. Axelrod

Imaging, modeling, and genetics reveal the roles of an atypical myosin in morphogenesis.

### FORUM: Highlights from Understanding Signaling Pathways in Cancer

L. K. Ferrarelli and N. R. Gough

Understanding the complexities of cell signaling is critical to developing therapies against cancer.

## SCIENCE TRANSLATIONAL MEDICINE

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

Integrating Medicine and Science

**28 November issue:** <http://scim.ag/stm112812>

### FOCUS: Time to Integrate Clinical and Research Informatics

I. L. Katzan and R. A. Rudick

Integration of electronic clinical and research data will ultimately improve patient care.

### RESEARCH ARTICLE: Treating Diabetes and Obesity with an FGF21-Mimetic Antibody Activating the $\beta$ Klotho/FGFR1c Receptor Complex

I. N. Foltz et al.

An antibody mimic of FGF21 exerts beneficial metabolic effects in obese monkeys.

### RESEARCH ARTICLE: Detection of Chromosomal Alterations in the Circulation of Cancer Patients with Whole-Genome Sequencing

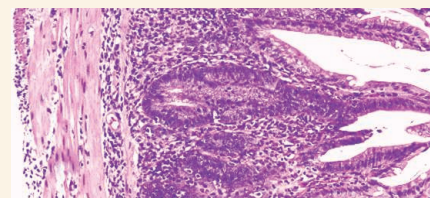
R. J. Leary et al.

Massively parallel sequencing directly detects tumor-derived chromosomal alterations in plasma DNA.

### RESEARCH ARTICLE: Tadalafil Treatment for Muscular Dystrophy Patients

E. A. Martin et al.

Tadalafil abrogates muscle ischemia in patients with Becker muscular dystrophy.



SCIENCE SIGNALING  
Intestinal colitis.

## SCIENCE CAREERS

[www.sciencereers.org/career\\_magazine](http://www.sciencereers.org/career_magazine)

Free Career Resources for Scientists

<http://scim.ag/SciCareers30November2012>

### Time Off for Dad

S. Gaidos

Paternity leave helps fathers *and* mothers advance their careers; too bad it is not more common.

### Robots, Fish, and Undergrads

S. Webb

John Long and his Vassar undergraduates study fish biomechanics and behavior.

## SCIENCE PODCAST

[www.sciencemag.org/multimedia/podcast](http://www.sciencemag.org/multimedia/podcast)

Free Weekly Show for 30 November 2012

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