

## EDITORIAL

- 1147 The Next Innovation Revolution  
*Susan Hockfield*

## NEWS OF THE WEEK

- 1154 NASA, ESA Choose King of Planets for Flagship Missions in 2020
- 1155 Forensic Science Needs a Major Overhaul, Panel Says
- 1156 Tangled Patent Dispute Over 'Free' Drug-Resistance Database
- 1157 Harvard Puts Science Campus on Slow Track
- 1158 Stimulus Gives DOE Billions for Carbon-Capture Projects
- 1159 Creationist Beliefs Persist in Europe
- 1160 Flu Antibodies Stir New Hope for Treatment, Vaccine
- 1161 NSF Restores Data on Minority Ph.D.'s
- 1161 From the *Science* Policy Blog

## NEWS FOCUS

- 1162 A 'Wimpy' Flu Strain Mysteriously Turns Scary  
*>> Science Podcast*
- 1164 Making Every Baby Girl Count  
Chinese Men: A Rising Tide of Troublemakers?
- 1167 Will Monju's Resurrection Give Breeders a Second Lease on Life?

## LETTERS

- 1168 Neuroscience and the Soul  
*M. J. Farah and N. Murphy*  
An Optimistic Read on Digital Libraries  
*J. Fellows*  
Developing Psychomotor Skills the Wii Way  
*C. S. Hill*  
Explaining the Reasoning-Fact Gap  
*S. M. Carlson*
- 1169 TECHNICAL COMMENT ABSTRACTS

## BOOKS ET AL.

- 1170 The Tragic Sense of Life  
*R. J. Richards, reviewed by L. K. Nyhart*  
H. G. Bronn, Ernst Haeckel, and the Origins of German Darwinism  
*S. Gliboff, reviewed by L. K. Nyhart*

## EDUCATION FORUM

- 1172 A National Ecological Network for Research and Education  
*M. Lowman et al.*

## PERSPECTIVES

- 1174 Stepping Out  
*R. H. Crompton and T. C. Pataky*  
*>> Report p. 1197*
- 1175 Tipping Pointedly Colder  
*L. R. Kump*  
*>> Report p. 1187*
- 1176 Harvesting Ocean Wave Energy  
*J. Scruggs and P. Jacob*
- 1178 Looking Below the Surface  
*A. J. Heinrich*  
*>> Report p. 1190*
- 1179 From Oral to Moral  
*P. Rozin et al.*  
*>> Report p. 1222*
- 1181 Retrospective: Frederic M. Richards (1925–2009)  
*T. A. Steitz*

## BREVIA

- 1183 Predicting Elections: Child's Play!  
*J. Antonakis and O. Dalgas*  
Children's choices of a ship's captain reflect adults' choices of a parliamentarian.  
*>> Science Podcast*

CONTENTS continued >>

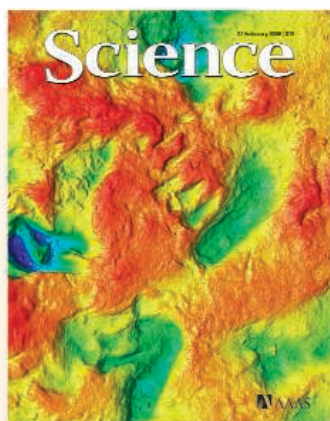


page 1162



page 1170

Downloaded from <http://science.sciencemag.org/> on November 15, 2018



## COVER

Optical laser scan of early hominin footprints at Ileret, Kenya, color-rendered to illustrate depth; reds indicate areas of high elevation, blues lower elevation. The footprints are 1.5 million years old and were probably made by *Homo ergaster/erectus*. Two right footprints and a partial left are visible along with a range of animal prints. See page 1197.

*Image processing in Rapidform™: Matthew Bennett/ Bournemouth University*

## DEPARTMENTS

- 1143 This Week in *Science*
- 1148 Editors' Choice
- 1150 *Science* Staff
- 1151 Random Samples
- 1153 Newsmakers
- 1182 AAAS News & Notes
- 1235 New Products
- 1236 *Science* Careers

## REPORTS

## 1184 Inducing a Magnetic Monopole with Topological Surface States

X.-L. Qi et al.

A magnetic monopole is theoretically predicted to be induced at the surface of a topological insulator.

## 1187 Global Cooling During the Eocene-Oligocene Climate Transition

Z. Liu et al.

When a permanent Antarctic ice sheet formed about 34 million years ago, high-latitude surface oceans cooled by about 5°C.

>> *Perspective p. 1175*

## 1190 Seeing the Fermi Surface in Real Space by Nanoscale Electron Focusing

A. Weismann et al.

Scanning tunneling microscopy can reveal the bulk Fermi surface of copper when buried cobalt atoms are present.

>> *Perspective p. 1178*

## 1193 Conductance of a Single Conjugated Polymer as a Continuous Function of Its Length

L. Lafferentz et al.

The conductance of a polyfluorene oligomer is measured as it is pulled off a gold surface.

## 1197 Early Hominin Foot Morphology Based on 1.5-Million-Year-Old Footprints from Ileret, Kenya

M. R. Bennett et al.

Footprints found near Lake Turkana show that human foot shape and gait had been achieved 1.5 million years ago.

>> *Perspective p. 1174*1201 RNA Polymerase IV Functions in Paramutation in *Zea mays*

K. F. Erhard Jr. et al.

In maize, a derivative RNA polymerase is responsible for passing on epigenetic changes to the next generation.

1205 Mutations in the *FUS/TLS* Gene on Chromosome 16 Cause Familial Amyotrophic Lateral Sclerosis

T. J. Kwiatkowski Jr. et al.

## 1208 Mutations in FUS, an RNA Processing Protein, Cause Familial Amyotrophic Lateral Sclerosis Type 6

C. Vance et al.

Mutations in an RNA processing protein, the second implicated, suggest that a common mechanism promotes Lou Gehrig's disease.

## 1211 Synchronous Hyperactivity and Intercellular Calcium Waves in Astrocytes in Alzheimer Mice

K. V. Kuchibhotla et al.

In a mouse model of Alzheimer's disease, astrocytes respond globally to plaque formation.

1215 Meropenem-Clavulanate Is Effective Against Extensively Drug-Resistant *Mycobacterium tuberculosis*

J.-E. Hugonnet et al.

Together, two FDA-approved drugs inhibit the growth of 13 antibiotic-resistant strains of the tuberculosis pathogen.

1218 Analysis of *Drosophila* Segmentation Network Identifies a JNK Pathway Factor Overexpressed in Kidney Cancer

J. Liu et al.

A developmental marker in fruit flies also acts as a marker of renal cell cancer in humans.

## 1222 In Bad Taste: Evidence for the Oral Origins of Moral Disgust

H. A. Chapman et al.

Responses to bad-tasting foods and morally repugnant actions are processed in overlapping regions of the brain.

>> *Perspective p. 1179*

## 1226 Blue or Red? Exploring the Effect of Color on Cognitive Task Performances

R. Mehta and R. (J.) Zhu

Blue favors creativity in humans, whereas red improves attention to detail.

## 1229 Self-Sustained Replication of an RNA Enzyme

T. A. Lincoln and G. F. Joyce

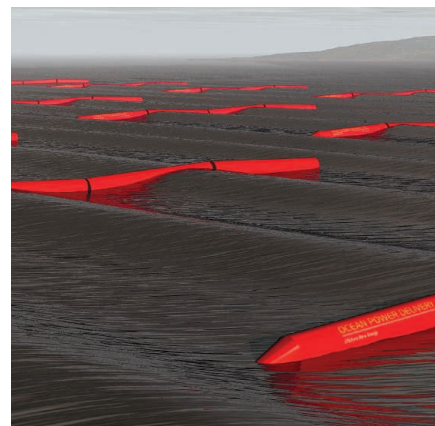
Two ribozymes synthesize each other from oligonucleotide substrates to give a self-replicating system.

## 1232 Antagonistic Actions of Msx1 and Osr2 Pattern Mammalian Teeth into a Single Row

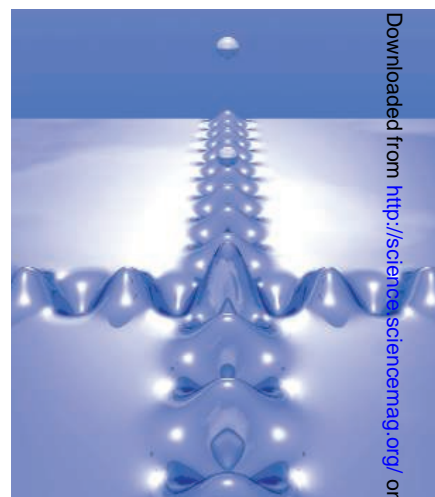
Z. Zhang et al.

A pair of transcription factors controls sites of tooth formation in mice by regulating the distribution of signals.

CONTENTS continued &gt;&gt;



page 1176



pages 1178 &amp; 1190



page 1201

## SCIENCEONLINE

## SCIENCEEXPRESS

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

**Greatly Expanded Tropical Warm Pool and Weakened Hadley Circulation in the Early Pliocene**  
*C. M. Brierley et al.*

The warm tropics of the Early Pliocene, about 4 million years ago, extended much farther toward the poles than they do today.  
10.1126/science.1167625

**RNA Pol II Accumulates at Promoters of Growth Genes During Developmental Arrest**

*L. R. Baugh et al.*

Growth and development genes, poised for expression during developmental arrest in nematodes, respond rapidly to feeding.  
10.1126/science.1169628

**A Transposon-Based Genetic Screen in Mice Identifies Genes Altered in Colorectal Cancer**

*T. K. Starr et al.*

A functional screen in mice uncovers genes that are likely to drive the growth of gut-specific tumors.  
10.1126/science.1163040

**Antibody Recognition of a Highly Conserved Influenza Virus Epitope**

*D. C. Ekiert et al.*

A broadly neutralizing antibody binds the hemagglutinin stalk of pathogenic influenza viruses to block membrane fusion.  
10.1126/science.1171491

## TECHNICALCOMMENTS

**Comment on "Multipartite Entanglement Among Single Spins in Diamond"**

*B. W. Lovett and S. C. Benjamin*

full text at [www.sciencemag.org/cgi/content/full/323/5918/1169c](http://www.sciencemag.org/cgi/content/full/323/5918/1169c)

**Response to Comment on "Multipartite Entanglement Among Single Spins in Diamond"**

*P. Neumann et al.*

full text at [www.sciencemag.org/cgi/content/full/323/5918/1169d](http://www.sciencemag.org/cgi/content/full/323/5918/1169d)

## SCIENCENOW

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

Highlights From Our Daily News Coverage

**Abuse Leaves Its Mark on the Brain**

Parental abuse alters a stress gene in the brain.

**Permanent Protection Against the Flu?**

A few antibodies may guard against a variety of influenza strains.

**X-ray Vision Reveals Intergalactic Medium**

Missing matter has been spotted in a supersized wall of galaxies.

## SCIENCE SIGNALING

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

The Signal Transduction Knowledge Environment

**RESEARCH ARTICLE: Dok-7 Activates the Muscle Receptor Kinase MuSK and Shapes Synapse Formation**

*A. Inoue et al.*

The cytoplasmic protein Dok-7 is required for the full activation of the receptor tyrosine kinase MuSK.

**RESEARCH ARTICLE: IL-17 Receptor Signaling Inhibits C/EBP $\beta$  by Sequential Phosphorylation of the Regulatory 2 Domain**

*F. Shen et al.*

The IL-17 receptor triggers dual, sequential phosphorylation of the transcription factor C/EBP $\beta$ , which represses the expression of target genes.

**REVIEW: Positive and Negative Modulation of Angiogenesis by VEGFR1 Ligands**

*Y. Cao*

PlGF and VEGF-B exhibit dual effects on angiogenesis mediated by VEGF-A.

**PERSPECTIVE: Jasmonate—Preventing the Maize Tassel from Getting in Touch with His Feminine Side**

*J. Browse*

Male identity in the maize tassel is controlled by jasmonate signaling.

**PERSPECTIVE: Chemoattractant Receptors and Leukocyte Recruitment—More Than Cell Migration**

*E. M. Borroni et al.*

Atypical "chemoattractant receptors" that do not signal through G proteins contribute to leukocyte recruitment through indirect mechanisms.

**MEETING REPORT: Signal Transduction Molecules as Targets for Cancer Prevention**

*A. M. Bode and Z. Dong*

Two conferences at The Hormel Institute highlight early intervention and chemoprevention in targeting cancer.

## SCIENCEPODCAST

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

Free Weekly Show

Download the 27 February *Science* Podcast to hear about predicting election outcomes, drug-resistant influenza, your letters to *Science*, and more.

## ORIGINSBLOG

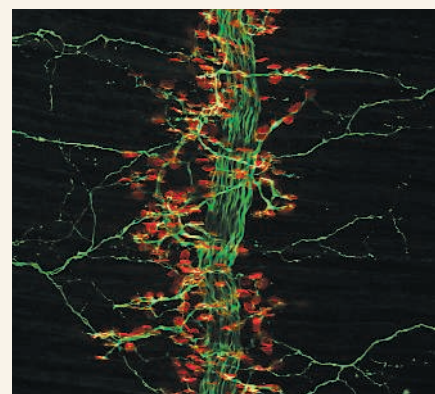
[blogs.sciencemag.org/origins](http://blogs.sciencemag.org/origins)

A History of Beginnings

## SCIENCEINSIDER

[blogs.sciencemag.org/scienceinsider](http://blogs.sciencemag.org/scienceinsider)

Science Policy News and Analysis



SCIENCE SIGNALING  
Innervating diaphragm muscle.

## SCIENCE CAREERS

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

Free Career Resources for Scientists

**Special Feature: Two Young, African-American Women in Science**

*J. Austin*

Our sample of African-American women reveals brilliance, scientific ambition, and progress against discrimination.

**When Ironies Make Perfect Sense**

*A. Sasso*

Gina Wingood, a black Catholic girl raised in a white suburb, found love and her calling in San Francisco's ghettos.

**The Bigger Questions**

*S. Gaidos*

Chemical engineer Kristala Jones Prather's career has taken her from academia to industry and back again.

**A Double Bind—Minority Women in Science in Europe**

*E. Pain*

Minority women in European science confront an issue that remains taboo.

**SCIENCE (ISSN 0036-8075) is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1200 New York Avenue, NW, Washington, DC 20005.** Periodicals Mail postage (publication No. 484460) paid at Washington, DC, and additional mailing offices. Copyright © 2009 by the American Association for the Advancement of Science. The title SCIENCE is a registered trademark of the AAAS. Domestic individual membership and subscription (51 issues): \$146 (\$74 allocated to subscription). Domestic institutional subscription (51 issues): \$835; Foreign postage extra: Mexico, Caribbean (surface mail) \$55; other countries (air assist delivery) \$85. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request, GST #1254 88122. Publications Mail Agreement Number 1069624. **Printed in the U.S.A.**

**Change of address:** Allow 4 weeks, giving old and new addresses and 8-digit account number. **Postmaster:** Send change of address to AAAS, P.O. Box 96178, Washington, DC 20090-6178. **Single-copy sales:** \$10.00 current issue, \$15.00 back issue prepaid includes surface postage; bulk rates on request. **Authorization to photocopy** material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act is granted by AAAS to libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that \$20.00 per article is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923. The identification code for *Science* is 0036-8075. *Science* is indexed in the *Reader's Guide to Periodical Literature* and in several specialized indexes.



ADVANCING SCIENCE. SERVING SOCIETY

# Science

**323 (5918)**

*Science* **323** (5918), 1143-1235.

**ARTICLE TOOLS**

<http://science.sciencemag.org/content/323/5918>

**PERMISSIONS**

<http://www.sciencemag.org/help/reprints-and-permissions>

Use of this article is subject to the [Terms of Service](#)

---

*Science* (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. 2017 © The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works. The title *Science* is a registered trademark of AAAS.