CONTENTS

EDITORIAL
289  Science Demystified
     Bruce Alberts and Marcia McNutt

NEWS OF THE WEEK
294  A roundup of the week’s top stories

NEWS & ANALYSIS
297  Stunning Skull Gives a Fresh Portrait of Early Humans
     >> Research Article p. 326; Slideshow
298  Molecule and Market Studies Capture Nobel Laurels
300  U.S. Shutdown Disrupts Long-Term Ecosystem Studies
     >> Science Podcast
301  Sleep: The Brain’s Housekeeper?
     >> Report p. 373
302  South Korea’s Charge Into Basic Research Meets Resistance
303  Botanists Spread the Gospel That Breadfruit Can Be Manna

NEWS FOCUS
304  Roving Into Martian Waters
307  Dr. Cool

LETTERS
310  China’s Rapid Urbanization
     X. J. Yang
     Gain-of-Function Research:
     Unproven Technique
     A. Mahmoud
     Gain-of-Function Research:
     Unknown Risks
     F. Rey et al.
311  CORRECTIONS AND CLARIFICATIONS

BOOKS ET AL.
312  Life at the Speed of Light
     J. C. Venter, reviewed by S. Roosth
313  Black Code
     R. J. Deibert, reviewed by L. DeNardis

POLICY FORUM
314  Probiotics: Finding the Right Regulatory Balance
     D. E. Hoffman et al.

PERSPECTIVES
316  Sleep It Out
     S. Herculano-Houzel
     >> Report p. 373
317  Perovskite-Based Solar Cells
     G. Hodes
     >> Reports pp. 341 and 344
318  Path to Treat Rett Syndrome
     A. K. Percy
320  How to Be Both Strong and Thermally Stable
     S. Ramtani
     >> Report p. 377
321  Did the Denisovans Cross Wallace’s Line?
     A. Cooper and C. B. Stringer
     >> Science Podcast
323  Soft Acoustic Metamaterials
     T. Brunet et al.

ON THE WEB THIS WEEK
>> Science Podcast
Listen to stories on a fungus deadly to frogs, Denisovans in Southeast Asia, the U.S. government shutdown’s effect on science, and more.

>> Find More Online
Check out Science Express, our podcast, videos, daily news, our research journals, and Science Careers at www.sciencemag.org.

COVER
Photo of a 1.77-million-year-old complete adult skull (braincase volume: 546 cubic centimeters) of early Homo from the site of Dmanisi, Georgia. Together with the fossilized bones of four additional individuals discovered in close proximity, the skull indicates that populations of early Homo comprised a wider range of morphological variation than traditionally assumed, which implies a single evolving lineage with continuity across continents. See pages 297 and 326.

Photo: © Guram Bumbiashvili/Georgian National Museum

DEPARTMENTS
288  This Week in Science
290  Editors’ Choice
292  Science Staff
381  New Products
382  Science Careers
RESEARCH ARTICLES

325 Hyperdominance in the Amazonian Tree Flora
H. ter Steege et al.
Amazonia harbors 16,000 tree species, 1.4% of which account for half of all individual trees.
Research Article Summary; for full text: http://dx.doi.org/10.1126/science.1243092

326 A Complete Skull from Dmanisi, Georgia, and the Evolutionary Biology of Early Homo
D. Lordkipanidze et al.
An early Pleistocene adult skull illuminates the evolution and morphology of the first hominins outside Africa.
>> News story p. 297

REPORTS

331 Stellar Spin-Orbit Misalignment in a Multiplanet System
D. Huber et al.
Kepler observations show that stellar spin-orbit misalignments are not confined to planetary systems with hot Jupiters.

334 Gravitational-Wave Limits from Pulsar Timing Constrain Supermassive Black Hole Evolution
R. M. Shannon et al.
Analysis of pulsar timing data sets constraints on the gravitational-wave background produced by pairs of massive black holes.

337 Strain-Induced Ultrahard and Ultrastable Nanolaminated Structure in Nickel
X. C. Liu et al.
Heavy shearing can produce a stronger, more thermally robust nickel microstructure.
>> Perspective p. 320

341 Electron-Hole Diffusion Lengths Exceeding 1 Micrometer in an Organometal Trihalide Perovskite Absorber
S. D. Stranks et al.

344 Long-Range Balanced Electron and Hole-Transport Lengths in Organic-Inorganic CH$_3$NH$_3$PbI$_3$
G. Xing et al.
Spectroscopy pinpoints facile carrier diffusion as a key factor in the efficiency of perovskite solar cells.
>> Perspective p. 317

347 Product-to-Parent Reversion of Trenbolone: Unrecognized Risks for Endocrine Disruption
S. Qu et al.
Phototransformation of growth steroid metabolites is readily reversible in aquatic environments.

351 Direct Spectroscopic Characterization of a Transitory Dirhodium Donor-Acceptor Carbene Complex
K. R. Kornecki et al.
A long-postulated reactive chemical intermediate has been observed and characterized.

355 Low Upper Limit to Methane Abundance on Mars
C. R. Webster et al.
Data from the Curiosity rover reveal an upper limit on Mars of only 1.3 parts per billion by volume for atmospheric methane.

357 Genomically Recoded Organisms Expand Biological Functions
M. J. Lajoie et al.
Bacteria engineered to use nonstandard amino acids show increased resistance to bacteriophage attack.

361 Probing the Limits of Genetic Recoding in Essential Genes
M. J. Lajoie et al.
Thirteen codons could be removed from all essential ribosomal protein-coding genes across 80 Escherichia coli strains.

364 Rapid Adaptation to Climate Facilitates Range Expansion of an Invasive Plant
R. I. Colautti and S. C. H. Barrett
Invasive populations of purple loosestrife in eastern North America have evolved increased fitness at the invasion front.

366 The Invasive Chytrid Fungus of Amphibians Paralyzes Lymphocyte Responses
J. S. Fites et al.
The global spread of a fungal disease of frogs may be explained by its ability to inhibit immune clearance.
>> Science Podcast

369 Measuring Chromatin Interaction Dynamics on the Second Time Scale at Single-Copy Genes
K. Poorey et al.
Formaldehyde cross-linking kinetics reveals rapid, site-specific transcription factor binding dynamics in vivo.

373 Sleep Drives Metabolite Clearance from the Adult Brain
L. Xie et al.
During sleep, metabolic waste products are removed from the extracellular spaces in the brain.
>> News story p. 301; Perspective p. 316

377 Reading Literary Fiction Improves Theory of Mind
D. C. Kidd and E. Castano
Experimental evidence suggests that reading good fiction helps us to understand others.