

EDITORIAL

- 722 **Speak Up for Science Funding**
Alan I. Leshner and Mary Woolley

NEWS OF THE WEEK

- 726 A roundup of the week's top stories

NEWS & ANALYSIS

- 728 **Scientists Assess Damage From Sandy's Deadly Punch**
- 730 **Did Pulses of Climate Change Drive the Rise and Fall of the Maya?**
>> Report p. 788
- 731 **Lung-on-a-Chip Breathes New Life Into Drug Discovery**
>> Sci. Transl. Med. Research Articles by D. Huh et al. and K. S. Thorneloe et al. and Perspective by D. M. Dambach and H. Uppal
- 732 **As Drug Pilot Wraps Up, a Lively Debate About Its Future**
- 733 **Question of Martian Methane Is Still Up in the Air**

NEWS FOCUS

- 734 **Weather Forecasts Slowly Clearing Up**
One Sandy Forecast a Bigger Winner Than Others
>> Science Podcast
- 738 **Poor but Smart**

LETTERS

- 740 **Limits to Religious Conservation Efforts**
B. Gong et al.
- Credit Due to Peter Higgs**
J. Ellis
- Evolution's Misleading Language**
A. N. Burdett
- 742 **TECHNICAL COMMENT ABSTRACTS**
- 742 **CORRECTIONS AND CLARIFICATIONS**

BOOKS ET AL.

- 743 **Visible Empire**
D. Bleichmar, reviewed by P. H. Smith
- 744 **Measurement**
P. Lockhart, reviewed by B. Finegold

POLICY FORUM

- 745 **Law and Science Collide Over Human Gene Patents**
R. Cook-Deegan

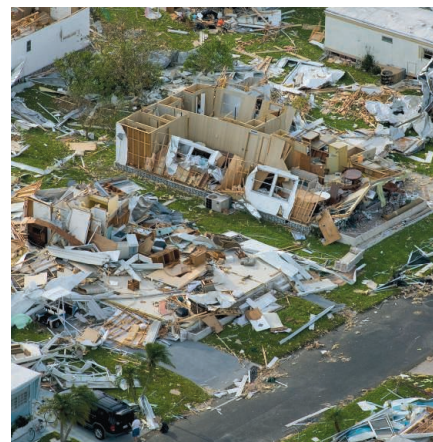
PERSPECTIVES

- 748 **A Decorated Virus Cannot Hide**
R. W. Herzog and D. A. Ostrov
>> Report p. 795
- 749 **Constraints on Sexual Selection**
M. J. Wade
>> Report p. 802
- 750 **Emerging Disease or Diagnosis?**
S. K. Gire et al.
- 752 **Driving the Formation of Molecular Knots**
J. S. Siegel
>> Report p. 783
- 754 **A Single-Molecule Engine**
M. W. Bockrath
>> Report p. 779
- 755 **Constraining Cloud Feedbacks**
K. M. Shell
>> Report p. 792
- 756 **Epigenetic Islands in a Genetic Ocean**
D. Schübeler

ASSOCIATION AFFAIRS

- 758 **Presidential Address: Transposable Elements, Epigenetics, and Genome Evolution**
N. V. Fedoroff

CONTENTS continued >>



page 734



page 743

Downloaded from <http://science.sciencemag.org/> on September 19, 2019



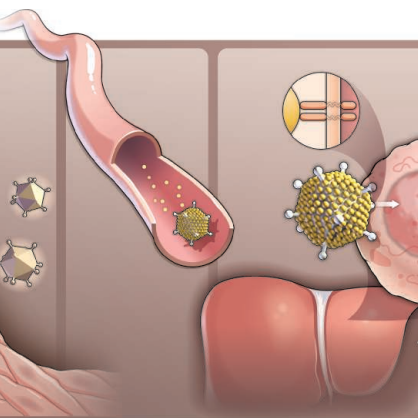
COVER

Masks on the facade of the Codz Poop Palace (Kabah site, Yucatan, Mexico). Kabah and other Maya sites in the Puuc region flourished during the Terminal Classic Period (800 to 1000 C.E.), while cities to the south collapsed as the climate became drier. Political collapse was part of a complex two-stage societal response to global climate change. See page 788.

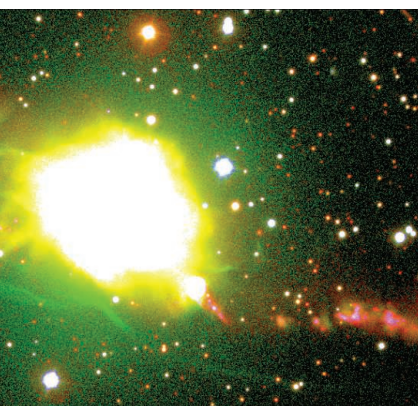
Photo: Getty Images/DEA/G. Dagli Orti

DEPARTMENTS

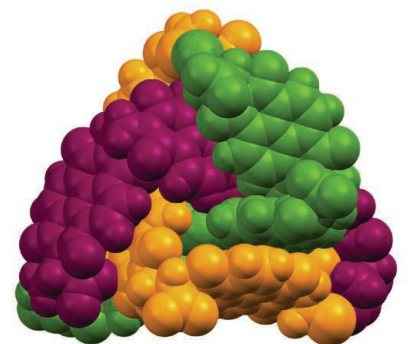
- 720 **This Week in Science**
- 723 **Editors' Choice**
- 724 **Science Staff**
- 825 **New Products**
- 826 **Science Careers**



pages 748 & 795



page 773



pages 752 & 783

REVIEW

- 768 **Hepcidin and the Iron-Infection Axis**
H. Drakesmith and A. M. Prentice

REPORTS

- 773 **An Interacting Binary System Powers Precessing Outflows of an Evolved Star**
H. M. J. Boffin et al.
Spectra of a planetary nebula's central star reveal a companion star responsible for launching the system's rotating jets.
- 775 **Polarity-Switching Top Coats Enable Orientation of Sub-10-nm Block Copolymer Domains**
C. M. Bates et al.
A chemical reaction in a thin polymer film imposes orientational ordering of lamellar domains in an underlying film.
- 779 **Driving a Macroscopic Oscillator with the Stochastic Motion of a Hydrogen Molecule**
C. Lotze et al.
The random motion of an activated hydrogen molecule produces forces that drive periodic motions of a scanning probe cantilever.
>> *Perspective p. 753*
- 783 **Discovery of an Organic Trefoil Knot**
N. Ponnuswamy et al.
Hydrophobic interactions appear to steer three molecular fragments into a knot, rather than a simpler ring geometry.
>> *Perspective p. 752*
- 785 **Tissint Martian Meteorite: A Fresh Look at the Interior, Surface, and Atmosphere of Mars**
H. Chennaoui Aoudjehane et al.
A meteorite that fell in Morocco in July 2011 provides a sample to study processes that operated on Mars 700,000 years ago.
- 788 **Development and Disintegration of Maya Political Systems in Response to Climate Change**
D. J. Kennett et al.
A record of rainfall from a stalagmite in southern Belize provides a context for better understanding Maya civilization.
>> *News story p. 730; Science Podcast*
- 792 **A Less Cloudy Future: The Role of Subtropical Subsidence in Climate Sensitivity**
J. T. Fasullo and K. E. Trenberth
Seasonal variations in tropospheric relative humidity may provide an observational constraint on climate sensitivity.
>> *Perspective p. 755*
- 795 **Coagulation Factor X Activates Innate Immunity to Human Species C Adenovirus**
K. Doronin et al.
Tagging adenovirus with a serum protein prompts an immune response when the virus enters cells.
>> *Perspective p. 748*
- 798 **Germ Cell Migration Across Sertoli Cell Tight Junctions**
B. E. Smith and R. E. Braun
Syncytial germ cell chains span a network of transient compartments to cross the blood-testis barrier in adult mice.
- 802 **Bateman in Nature: Predation on Offspring Reduces the Potential for Sexual Selection**
J. Byers and S. Dunn
The relationship between mate number and offspring output in male pronghorn confirms Bateman's findings.
>> *Perspective p. 749*
- 804 **Corals Chemically Cue Mutualistic Fishes to Remove Competing Seaweeds**
D. L. Dixon and M. E. Hay
Goby fish remove toxic algae from their coral habitat, becoming more distasteful to predators in the process.
>> *Science Podcast*
- 807 **A Core Metabolic Enzyme Mediates Resistance to Phosphine Gas**
D. I. Schlupialius et al.
Mutations in a lipoic acid metabolism enzyme confer resistance to phosphine but also result in sensitivity to arsenite.
- 810 **Optical Control of Protein Activity by Fluorescent Protein Domains**
X. X. Zhou et al.
Shining light onto an engineered fluorescent protein controls the activity of domains fused to the protein.
- 815 **Intramitochondrial Transport of Phosphatidic Acid in Yeast by a Lipid Transfer Protein**
M. Connerth et al.
A lipid transfer protein, Ups1, controls the accumulation of cardiolipin in mitochondrial outer and inner membranes.
- 818 **IRE1 α Cleaves Select microRNAs During ER Stress to Derepress Translation of Proapoptotic Caspase-2**
J.-P. Upton et al.
Protein misfolding stimulates the destruction of microRNAs and the synthesis of an enzyme that promotes cell death.
- 822 **Mitochondrial Network Size Scaling in Budding Yeast**
S. M. Rafelski et al.
Yeast cells produce buds with uniform mitochondrial content, even as the aging mother cell loses out.

SCIENCEEXPRESS

www.scienceexpress.org

Publication Ahead of Print

Kinetic Responses of β -Catenin Specify the Sites of Wnt Control

A. R. Hernandez et al.

10.1126/science.1228734

Acute Inflammation Initiates the Regenerative Response in the Adult Zebrafish Brain

N. Kyriasis et al.

10.1126/science.1228773

Cytoplasmic ATP Hydrolysis Powers Transport of Lipopolysaccharide Across the Periplasm in *E. coli*

S. Okuda et al.

10.1126/science.1228984

Robust Photogeneration of H₂ in Water Using Semiconductor Nanocrystals and a Nickel Catalyst

Z. Han et al.

10.1126/science.1227775

TECHNICAL COMMENTS

Comment and Response on "Glacial Survival of Boreal Trees in Northern Scandinavia"

Comment: H. H. Birks et al.

<http://dx.doi.org/10.1126/science.1225345>

Response: L. Parducci et al.

<http://dx.doi.org/10.1126/science.1225476>

SCIENCE NOW

www.sciencenow.org

Highlights From Our Daily News Coverage

The Innovative Cockatoo:

Figaro Invents, Makes, and Uses a Tool Even among birds, necessity is the mother of invention.

<http://scim.ag/Innovative-Cockatoo>

The Eternal Youth of Asteroid Vesta

The Dawn spacecraft shows how Vesta's blemishes are removed, but why isn't space aging it?

<http://scim.ag/Eternal-Youth>

Many-Eyed Monsters Prove the Eyes Have It

People seek out others' eyes, even when they are not centered on the face.

http://scim.ag/Seek_Eyes

SCIENCE SIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment

6 November issue: <http://scim.ag/ss110612>

RESEARCH ARTICLE: Key Roles for the Lipid Signaling Enzyme Phospholipase D1 in the Tumor Microenvironment During Tumor Angiogenesis and Metastasis

Q. Chen et al.

PODCAST

M. A. Frohman and A. M. VanHook

Tumor growth and metastasis are attenuated in mice lacking a lipid signaling enzyme.

RESEARCH ARTICLE: Proliferative and Antiapoptotic Signaling Stimulated by Nuclear-Localized PDK1 Results in Oncogenesis

C. K. Kikani et al.

PDK1 in the nucleus drives oncogenesis in mice and correlates with human prostate tumor grade.

PERSPECTIVE: Sexy DEG/ENaC Channels Involved in Gustatory Detection of Fruit Fly Pheromones

C. W. Pikielny et al.

DEG/ENaC channels allow male fruit flies to "taste" their mates.

PERSPECTIVE: Grb2, A Double-Edged Sword of Receptor Tyrosine Kinase Signaling

A. A. Belov and M. Mohammadi

The adaptor Grb2 plays both positive and negative roles in FGF receptor signaling.

SCIENCE TRANSLATIONAL MEDICINE

www.sciencetranslationalmedicine.org

Integrating Medicine and Science

7 November issue: <http://scim.ag/stm110712>

RESEARCH ARTICLE: A Human Disease Model of Drug Toxicity-Induced Pulmonary Edema in a Lung-on-a-Chip Microdevice

D. Huh et al.

A human lung-on-a-chip model of human pulmonary edema predicts the efficacy of a new drug being tested in animals.

RESEARCH ARTICLE: An Orally Active TRPV4 Channel Blocker Prevents and Resolves Pulmonary Edema Induced by Heart Failure

K. S. Thorneloe et al.

Blocking TRPV4 ion channels expressed in the lung in vivo and in vitro resolves pulmonary edema induced by heart failure.

PERSPECTIVE: Improving Risk Assessment

D. M. Dambach and H. Uppal

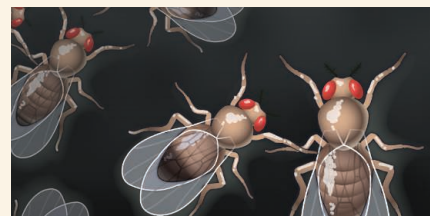
A collaborative effort to build human organs-on-a-chip may strengthen drug-related adverse-event prediction.

>> [News story p. 731](#)

RESEARCH ARTICLE: Human Melanoma Metastasis in NSG Mice Correlates with Clinical Outcome in Patients

E. Quintana et al.

The ability of melanomas to produce circulating tumor cells and metastasize in immunocompromised mice correlates with their ability to form distant metastases in patients.



SCIENCE SIGNALING
Courting fruit flies.

COMMENTARY: Research Results—Preserving Newborn Blood Samples

M. H. Lewis et al.

The debate about retention of dried blood samples from newborns should include their value to biomedical research.

SCIENCE CAREERS

www.sciencereers.org/career_magazine

Free Career Resources for Scientists

<http://scim.ag/SciCareers9November2012>

Alternative Research Metrics

L. Laursen

Researchers are seeking faster, better ways to measure research output and impact.

Content Collection: Talking to the Public

E. Pain

The benefits of public engagement justify the effort required to develop the necessary skills.

SCIENCE PODCAST

www.sciencemag.org/multimedia/podcast

Free Weekly Show for 9 November 2012

Listen to stories on coral symbiosis, climate change and the Maya, the challenges of weather forecasting, and more.

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 © 2012 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): \$149 (\$74 allocated to subscription). Domestic institutional subscription (51 issues): \$990; 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 \$30.00 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

338 (6108)

Science **338** (6108), 720-825.

ARTICLE TOOLS

<http://science.sciencemag.org/content/338/6108>

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. The title *Science* is a registered trademark of AAAS.

Copyright © 2012 The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works.