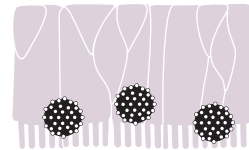


# CONTENTS



## 1055 & 1071

Routes to  
eradicate infection

4 SEPTEMBER 2015 • VOLUME 349 • ISSUE 6252



### FEATURES: SCIENCE IN IRAN

#### 1038 UNSANCTIONED SCIENCE

Despite penury and isolation, Iran's scientists have pursued an ambitious agenda. If sanctions end, research will blossom *By R. Stone*

▶ **1042 An eye on the sky** *By R. Stone*

▶ PODCAST

#### 1044 SAVING IRAN'S GREAT SALT LAKE

With ecosystems and agriculture at stake, stopping Lake Urmia from turning to salt desert is the country's top environmental priority *By R. Stone*

▶ **1046 Fragile ecosystems under pressure**

*By R. Stone*

SEE ALSO ▶ EDITORIAL P. 1029 ▶ SLIDESHOW

### ON THE COVER



A headlamp casts a glow on salt flats at Iran's Lake Urmia, which has shrunk to around 10% of its original 5200-square-kilometer area

because of poor water management. Lake Urmia is the focus of a massive restoration program, one of several ambitious science and technology efforts in Iran that may benefit if the country's isolation ends. See pages 1029 and 1038.

*Photo: Ebrahim Mirmalek*

## NEWS

### IN BRIEF

**1030** Roundup of the week's news

### IN DEPTH

#### 1032 MANTLE PLUMES SEEN RISING FROM EARTH'S CORE

Fat tubes of hot rock could alter views of how the planet cooled *By E. Hand*

▶ **1033 Ocean robots listen for earthquake echoes**

*By E. Hand*

#### 1034 HOW FARM LIFE PREVENTS ASTHMA

Lung reaction to bacteria may explain protection for farm children, bolstering hygiene hypothesis *By J. Kaiser*

▶ REPORT P. 1106

#### 1035 ARTIFICIAL TRACHEA PIONEER CLEARED OF MISCONDUCT CHARGES

Independent investigator had incomplete information, Karolinska Institute says *By G. Vogel*

#### 1036 PUBPEER CO-FOUNDER REVEALS IDENTITY—AND NEW PLANS

Neuroscientist Brandon Stell wants to raise funds to expand postpublication critiques *By J. Couzin-Frankel*

#### 1037 GLOBAL AGRICULTURAL RESEARCH NETWORK IS OVERHAULED AGAIN

CGIAR looks for antidote to tapering funding and internal woes

*By D. Normile*

## INSIGHTS

### PERSPECTIVES

#### 1048 SUSTAINABLE DEVELOPMENT AGENDA: 2030

Building knowledge-based societies is key to transformative technologies

*By W. Colglazier*

#### 1050 YEAST CELL FACTORIES ON THE HORIZON

Metabolic engineering in yeast gets increasingly more versatile

*By J. Nielsen*

▶ REPORT P. 1095

#### 1052 LIGHTING THE FUSE ON TOXIC TNT

An enzyme that helps control reactive oxidants sensitizes plants to TNT pollution *By G. Noctor*

▶ RESEARCH ARTICLE P. 1072

#### 1053 ENERGY FLOWS IN ECOSYSTEMS

Relationships between predator and prey biomass are remarkably similar in different ecosystems *By J. Cebrian*

▶ RESEARCH ARTICLE P. 1070

#### 1055 FRAGMENTED COMMUNICATION BETWEEN IMMUNE CELLS

Neutrophils blaze a trail with migratory cues for T cells to follow to sites of infection *By E. Kiermaier and M. Sixt*

▶ RESEARCH ARTICLE P. 1071

#### 1056 FUELING CONNECTIONS BETWEEN CHEMISTRY AND BIOLOGY

Chemical reactions create far-from-equilibrium materials by mastering self-assembly *By D. van der Zwaag and E. W. Meijer*

▶ REPORT P. 1075

#### 1058 MICROBIAL GROWTH DYNAMICS AND HUMAN DISEASE

Examining microbial genome replication in tissues may reflect health status

*By J. A. Segre*

▶ REPORT P. 1101

#### 1059 THE MECHANISM OF CRYSTAL DEFORMATION

Microscopy provides an atomistic view of how crystalline materials deform

*By W. D. Kaplan*

▶ REPORT P. 1080

### BOOKS ET AL.

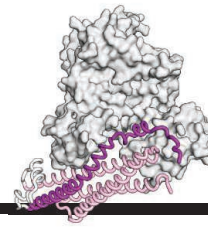
#### 1061 NATURAL CAPITAL

*By D. Helm, reviewed by D. Capistrano*

#### 1062 BIG SCIENCE

*By M. Hiltzik, reviewed by A. Wellerstein*

# CONTENTS



1111

A key mechanism in membrane fusion

4 SEPTEMBER 2015 • VOLUME 349 • ISSUE 6252

## 1063 BIO ART

By *W. Myers*

## LETTERS

### 1064 HOT GENOME LEAVES NATURAL HISTORIES COLD

By *X. Lu*

### 1064 DOCUMENTING RARE DISEASE DATA IN CHINA

By *H. Lin et al.*

### 1064 ACKNOWLEDGING AI'S DARK SIDE

By *C. Didier et al.*

## 1065 TECHNICAL COMMENT ABSTRACTS

# RESEARCH

## IN BRIEF

1066 From *Science* and other journals

## REVIEW

### 1069 EPIDEMIOLOGY

Why infectious disease research needs community ecology *P. T. J. Johnson et al.*

REVIEW SUMMARY; FOR FULL TEXT:

[dx.doi.org/10.1126/science.1259504](http://dx.doi.org/10.1126/science.1259504)

## RESEARCH ARTICLES

### 1070 MACROECOLOGY

The predator-prey power law: Biomass scaling across terrestrial and aquatic biomes *I. A. Hatton et al.*

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:

[dx.doi.org/10.1126/science.aac6284](http://dx.doi.org/10.1126/science.aac6284)

► PERSPECTIVE P. 1053



### 1071 T CELL CHEMOTAXIS

Neutrophil trails guide influenza-specific CD8<sup>+</sup> T cells in the airways *K. Lim et al.*

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:

[dx.doi.org/10.1126/science.aaa4352](http://dx.doi.org/10.1126/science.aaa4352)

► PERSPECTIVE P. 1055

### 1072 PLANT SCIENCE

Monodehydroascorbate reductase mediates TNT toxicity in plants

*E. J. Johnston et al.*

► PERSPECTIVE P. 1052

## REPORTS

### 1075 CHEMISTRY

Transient assembly of active materials fueled by a chemical reaction

*J. Boekhoven et al.*

► PERSPECTIVE P. 1056

### 1080 METALLURGY

Linear complexions: Confined chemical and structural states at dislocations

*M. Kuzmina et al.*

► PERSPECTIVE P. 1059

### 1083 MATERIALS SCIENCE

Highly thermally conductive and mechanically strong graphene fibers

*G. Xin et al.*

### 1087 CATALYSIS

Sustainable Fe–ppm Pd nanoparticle catalysis of Suzuki–Miyaura cross-couplings in water *S. Handa et al.*

## 1091 NATURAL HAZARDS

Slip pulse and resonance of the Kathmandu basin during the 2015 Gorkha earthquake, Nepal

*J. Galetzka et al.*

## 1095 SYNTHETIC BIOLOGY

Complete biosynthesis of opioids in yeast *S. Galanie et al.*

► PERSPECTIVE P. 1050

## 1101 MICROBIOME

Growth dynamics of gut microbiota in health and disease inferred from single metagenomic samples *T. Korem et al.*

► PERSPECTIVE P. 1058

## 1106 ALLERGY

Farm dust and endotoxin protect against allergy through A20 induction in lung epithelial cells *M. J. Schuijs et al.*

► NEWS STORY P. 1034

## 1111 MEMBRANE FUSION

A direct role for the Sec1/Munc18-family protein Vps33 as a template for SNARE assembly *R. W. Baker et al.*

## 1115 RNA EDITING

RNA editing by ADAR1 prevents MDA5 sensing of endogenous dsRNA as nonself *B. J. Liddicoat et al.*

## 1120 DNA SEGREGATION

Structures of archaeal DNA segregation machinery reveal bacterial and eukaryotic linkages *M. A. Schumacher et al.*

## DEPARTMENTS

### 1029 EDITORIAL

Iran, science, and collaboration  
By *Mohammad Farhadi*

► SCIENCE IN IRAN SECTION P. 1038

### 1134 WORKING LIFE

When science fails a scientist  
By *Kim Hunter-Schaedle*

Science Staff ..... 1028  
New Products ..... 1125  
Science Careers ..... 1126

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 © 2015 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): \$153 (\$74 allocated to subscription). Domestic institutional subscription (51 issues): \$1282. 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 #R1254 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.

# Science

**349 (6252)**

*Science* **349** (6252), 1029-1134.

**ARTICLE TOOLS**

<http://science.sciencemag.org/content/349/6252>

**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.