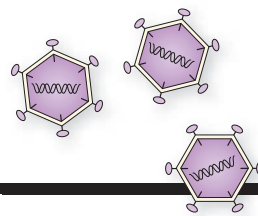


# CONTENTS

6 MARCH 2015 • VOLUME 347 • ISSUE 6226



## 1069

The ups and downs of drugging RNAi

### SPECIAL SECTION

## GENERAL RELATIVITY TURNS 100

### INTRODUCTION

**1082** Einstein's vision

### NEWS

**1084** To catch a wave *By A. Cho*

**1089** The dark lab *By D. Clery*

**1094** General Relativity: The comic book

**1096** Drop test *By A. Cho*

### REVIEWS

**1100** The dark side of cosmology: Dark matter and dark energy *D. N. Spergel*

**1103** A century of general relativity: Astrophysics and cosmology *R. D. Blandford*

### ON THE COVER



In 1915, Albert Einstein was a celebrity. His idea of seamlessly interwoven space and time—spacetime—had revolutionized physics and dazzled the world. Then he published his masterpiece: a short

paper describing how warped spacetime creates gravity. A century later, that “general theory of relativity” remains a pillar of physics and Einstein a peerless scientific icon. See page 1082. *Photo: Orren Jack Turner, Prints & Photographs Division, Library of Congress, LC-USZ62-60242*

**SEE ALSO** ▶ BOOKS *ET AL.* P. 1078 ▶ REPORT P. 1123 ▶ ONLINE NEWS STORY ▶ ANIMATION ▶ QUIZ  
▶ VIDEO ▶ [sciencemag.org/site/special/generalrelativity](http://sciencemag.org/site/special/generalrelativity)

## NEWS

### IN BRIEF

**1048** Roundup of the week's news

### IN DEPTH

#### **1051** A PRISTINE AMAZON'S LAST STAND

Laboratory in the sky will sample some of the last unspoiled air on the planet *By L. Wade*

#### **1052** MUONS PROBE FUKUSHIMA'S RUINS

Unsung imaging technique deployed to find uranium debris in reactors *By D. Normile*

#### **1054** WHY MANY U.S. BIOLOGY TEACHERS ARE 'WISHY-WASHY'

Future science teachers lack knowledge and role models *By J. Mervis*

#### **1055** DOUBTS DISPELLED ABOUT HIV PREVENTION

New studies show remarkable efficacy and versatility of drugs for uninfected *By J. Cohen*

**1056** Drug flushes out hidden AIDS virus *By J. Cohen*

#### **1056** DEEP ROOTS FOR THE GENUS *HOMO*

Fossil jawbone pushes back origins of our genus by 400,000 years *By A. Gibbons*  
▶ REPORT BY VILLMOARE *ET AL.* 10.1126/science.aaa1343; REPORT BY DIMAGGIO *ET AL.* 10.1126/science.aaa1415

### FEATURE

#### **1058** CLEANUP CREW

Unorthodox immune proteins called natural antibodies target pathogens and remove cellular and molecular waste *By M. Leslie*

## INSIGHTS

### PERSPECTIVES

#### **1062** A SUSTAINABLE MODEL FOR ANTIBIOTICS

How can we foster the development of novel drugs against resistant bacteria? *By M. Perros*

▶ PERSPECTIVE P. 1064

#### **1064** A RETURN TO THE PRE-ANTIMICROBIAL ERA?

The effects of antimicrobial resistance will be felt most acutely in lower-income countries *By S. Baker*

▶ PERSPECTIVE P. 1062; PODCAST

#### **1066** STATISTICS REQUANTITATES THE CENTRAL DOGMA

Transcription, not translation, chiefly determines protein abundance in mammals *By J. J. Li and M. D. Biggin*  
▶ RESEARCH ARTICLE P. 1112

#### **1068** NEW WORLD MONKEY ORIGINS

Fossils in Peru raise questions about the early evolution of monkeys in South America *By R. F. Kay*

#### **1069** DRUGGING RNAI

RNAi therapeutics are emerging as a major drug discovery engine *By D. Haussecker and M. A. Kay*

#### **1071** VIRAL CHEMOKINE MIMICRY

How do viruses trick the human immune system? *By J. Standfuss*  
▶ RESEARCH ARTICLES PP. 1113 & 1117

#### **1072** SINGLE PROTEINS UNDER A DIAMOND SPOTLIGHT

A diamond nanomagnetometer is used to probe conformational changes of a single protein *By P. Hemmer and C. Gomes*

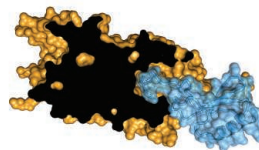
▶ REPORT P. 1135

#### **1073** LOOK BUT DON'T TOUCH THE METALS

Nitrogen-vacancy defects in diamond can probe metallic conductivity at a distance *By L. P. McGuinness and F. Jelezko*

▶ REPORT P. 1129

# CONTENTS



## 1071, 1113, & 1117

How chemokines bind their receptors

6 MARCH 2015 • VOLUME 347 • ISSUE 6226

### 1075 BEING SMART ABOUT SMART ENVIRONMENTAL TARGETS

Focus on the negotiation process, not just the end target  
By *S. L. Maxwell* et al.

### BOOKS ET AL.

#### 1077 WHY DID THE CHICKEN CROSS THE WORLD?

By *A. Lawler*, reviewed by *G. Larson*

#### 1078 EINSTEIN'S UNIFICATION

By *J. van Dongen*, reviewed by *M. Janssen*  
► GENERAL RELATIVITY TURNS 100 P. 1082

### LETTERS

#### 1079 A BETTER WAY FORWARD FOR BRAZIL'S FISHERIES

By *F. Di Dario* et al.

#### 1079 COMPLEX ECOLOGY OF CHINA'S SEAWALL

By *X.-W. Huang* et al.

#### 1080 RESPONSE

By *Z. Ma* and *B. Li*

#### 1080 TECHNICAL COMMENT ABSTRACTS

#### 1080 ERRATA

## RESEARCH

### IN BRIEF

1109 From *Science* and other journals

### RESEARCH ARTICLES

#### 1112 IMMUNOGENETICS

Dynamic profiling of the protein life cycle in response to pathogens  
*M. Jovanovic* et al.

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:  
[dx.doi.org/10.1126/science.1259038](http://dx.doi.org/10.1126/science.1259038)

► PERSPECTIVE P. 1066

### STRUCTURAL BIOLOGY

1113 Structural basis for chemokine recognition and activation of a viral G protein-coupled receptor  
*J. S. Burg* et al.

1117 Crystal structure of the chemokine receptor CXCR4 in complex with a viral chemokine *L. Qin* et al.

► PERSPECTIVE P. 1071

### REPORTS

#### 1123 ASTROPHYSICS

Multiple images of a highly magnified supernova formed by an early-type cluster galaxy lens *P. L. Kelly* et al.

► GENERAL RELATIVITY TURNS 100 P. 1082

#### 1126 STELLAR DYNAMICS

The fastest unbound star in our Galaxy ejected by a thermonuclear supernova  
*S. Geier* et al.

#### 1129 QUANTUM ELECTRONICS

Probing Johnson noise and ballistic transport in normal metals with a single-spin qubit *S. Kolkowitz* et al.

► PERSPECTIVE P. 1073

#### 1132 REPELLENT MATERIALS

Robust self-cleaning surfaces that function when exposed to either air or oil *Y. Lu* et al.

#### 1135 PROTEIN IMAGING

Single-protein spin resonance spectroscopy under ambient conditions  
*F. Shi* et al.

► PERSPECTIVE P. 1072

#### 1138 BRAIN STRUCTURE

Cell types in the mouse cortex and hippocampus revealed by single-cell RNA-seq *A. Zeisel* et al.

#### 1142 FRESHWATER ECOLOGY

Experimental nutrient additions accelerate terrestrial carbon loss from stream ecosystems  
*A. D. Rosemond* et al.

### 1145 POLITICAL ECONOMY

On the endogeneity of political preferences: Evidence from individual experience with democracy  
*N. Fuchs-Schündeln* and *M. Schündeln*

### 1148 NUCLEAR PORES

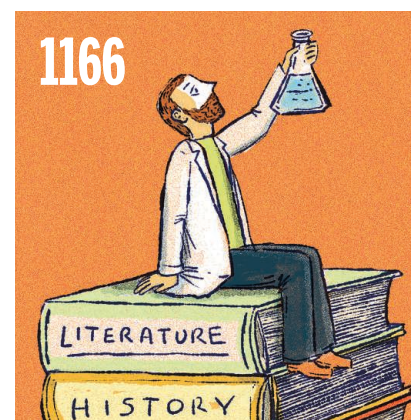
Architecture of the nuclear pore complex coat *T. Stuwe* et al.

### 1152 PROTEIN TARGETING

Structure of the Get3 targeting factor in complex with its membrane protein cargo *A. Mateja* et al.

### 1155 EVOLUTIONARY GENOMICS

Evolutionary changes in promoter and enhancer activity during human corticogenesis  
*S. K. Reilly* et al.



### DEPARTMENTS

#### 1047 EDITORIAL

It starts with a poster  
By *Marcia McNutt*

#### 1166 WORKING LIFE

Oh the humanities!  
By *Kevin Boehnke*

Science Staff ..... 1046  
New Products ..... 1160  
Science Careers ..... 1161

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 #1254 88122. Publications Mail Agreement Number 1069624. Printed in the U.S.A. Change of address: Allow 4 weeks. 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

**347 (6226)**

*Science* **347** (6226), 1047-1166.

**ARTICLE TOOLS**

<http://science.sciencemag.org/content/347/6226>

**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 © 2015 The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works.