

## SPECIAL SECTION

### Remote sensing

#### INTRODUCTION

**186** Measuring Earth's carbon cycle

#### RESEARCH ARTICLES

**188** The Orbiting Carbon Observatory-2 early science investigations of regional carbon dioxide fluxes *A. Eldering et al.*

**189** OCO-2 advances photosynthesis observation from space via solar-induced chlorophyll fluorescence *Y. Sun et al.*

**190** Influence of El Niño on atmospheric CO<sub>2</sub> over the tropical Pacific Ocean: Findings from NASA's OCO-2 mission *A. Chatterjee et al.*

**191** Contrasting carbon cycle responses of the tropical continents to the 2015–2016 El Niño *J. Liu et al.*

**192** Spaceborne detection of localized carbon dioxide sources *F. M. Schwandner et al.*

#### ON THE COVER



This artist's rendition of Earth uses data obtained from the Orbiting Carbon Observatory-2 (OCO-2) to show a time-averaged, false-color view of

the concentration of atmospheric CO<sub>2</sub> over Asia, parts of Africa, and Europe. In this issue (see page 186), the initial results from the OCO-2 mission are reported, including El Niño's effects on CO<sub>2</sub> fluxes, detection of CO<sub>2</sub> emissions from point sources, and measurement of terrestrial photosynthesis. For more on the process behind the cover image, see <http://scim.ag/2xmJxiU>. *Data visualization: C. Bickel/Science; NASA Scientific Visualization Studio*

## NEWS

### IN BRIEF

**152** News at a glance

### IN DEPTH

#### **155** DRUG-RESISTANT MALARIA ADVANCES IN MEKONG

Dangerous strain has spread to Vietnam, but experts sharply dispute its risk to the world *By L. Roberts*

#### **156** COLD, CLEAR VIEW OF MOLECULES NETS CHEMISTRY PRIZE

Cryo-EM nears sharpness of x-ray crystallography

*By R. Service and E. Stokstad*

#### **157** HOW AFRICANS EVOLVED A PALETTE OF SKIN TONES

Gene variants show that the evolution of skin color was anything but black and white *By A. Gibbons*

► RESEARCH ARTICLE BY N. G. CRAWFORD ET AL. 10.1126/SCIENCE.AAN8433

#### **158** EVOLUTION ACCELERATED WHEN LIFE SET FOOT ON LAND

Opportunities of terrestrial living sped innovation *By E. Pennisi*

#### **159** 'SCIENCE WARS' VETERAN HAS A NEW MISSION

Bruno Latour was a thorn in scientists' sides. Now, he wants to rebuild trust in their work *By J. de Vriese*

#### **160** MOST DISTANT MILKY WAY OUTPOST MAPPED

Star-forming region 66,000 light-years away helps trace galaxy's veiled spiral arm *By J. Sokol*

► REPORT P. 227

#### **161** PUBLISHERS TAKE ACADEMIC NETWORKING SITE TO COURT

Plaintiffs accuse site of massive copyright violation *By D. Singh Chawla*

### FEATURE

#### **162** A COLD CASE

Years ago, two women allege, their team leader sexually harassed them in Antarctica. Now they are taking action *By M. Wadman*

## INSIGHTS

### PERSPECTIVES

#### **166** ADDRESSING SUPPLY ISSUES FOR NATURAL PRODUCTS IN THE CLINIC

An efficient chemical synthesis of scarce bryostatin 1 will enable wider clinical trials *By B. A. Lanman*

► REPORT P. 218

#### **167** A DIRECT LOOK AT HALOGEN BONDS

High-resolution images of halogen-containing molecules reveal unusual bonding patterns *By J. B. Neaton*

► REPORT P. 206

#### **169** HELPING ROBOTS BLEND INTO THE BACKGROUND

The skin of soft inflatable robots is camouflaged by changing surface texture and color *By C. Laschi*

► REPORT P. 210

#### **170** QUANTUM EMITTERS IN TWO DIMENSIONS

Two-dimensional materials offer potential for developing integrated quantum technologies

*By I. Aharonovich and M. Toth*

#### **171** LIFE, DEATH, AND ANTIBODIES

The search for high-affinity antibodies by B cells leaves a trail of molecular destruction

*By V. L. Bryant and P. D. Hodgkin*

► RESEARCH ARTICLE P. 193

#### **172** ATLAS...T, PATTERNS FROM EVERY CELL

Microfluidics and DNA sequencing meet to create the first atlas of an embryo at single-cell resolution

*By M. R. Stadler and M. B. Eisen*

► RESEARCH ARTICLE P. 194

#### **174** SIR PATRICK BATESON (1938–2017)

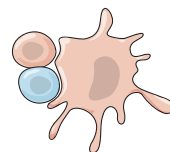
Influential researcher of the biology of animal behavior *By B. J. McCabe*

### POLICY FORUM

#### **175** REPRODUCTIVE HEALTH IN CULTURE WARS CROSSFIRE

The "Gag Rule" is endangering health in Africa and globally *By B. B. Crane et al.*

# CONTENTS



## 171 & 193

How B cells select antibodies

13 OCTOBER 2017 • VOLUME 358 • ISSUE 6360

### BOOKS ET AL.

#### 177 TRACKING TODAY

The art of observing animal movement has come a long way, thanks to advances in data science and technology

By *J. R. Ginsberg*

#### 178 A FUTURE ON FIRE

Climate change and conservative forest management may mean bigger and more frequent wildfires

By *H. A. Kramer*

### LETTERS

#### 179 BRAZIL'S DEVELOPMENT TURNS RIVER INTO SEA

By *M. F. G. Brito and A. L. B. Magalhães*

#### 179 BRAZIL'S SCIENTISTS AND CHURCHES SHARE GOALS

By *R. Fadini and G. W. Fernandes*

#### 180 SAND IN DEMAND: TRAPPED BEHIND DAMS

By *G. Gomby*

#### 180 TECHNICAL COMMENT ABSTRACTS

## RESEARCH

### IN BRIEF

183 From *Science* and other journals

### RESEARCH ARTICLES

#### 193 IMMUNOLOGY

The microanatomic segregation of selection by apoptosis in the germinal center

*C. T. Mayer et al.*

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT: [dx.doi.org/10.1126/science.aao2602](https://doi.org/10.1126/science.aao2602)

► PERSPECTIVE P. 171

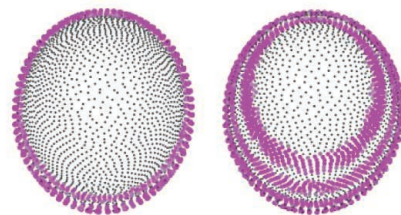
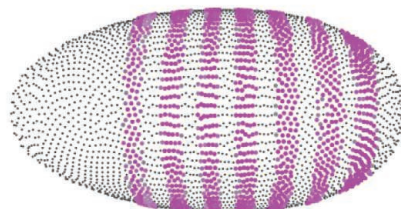
#### 194 SINGLE-CELL ANALYSIS

The *Drosophila* embryo at single-cell transcriptome resolution

*N. Karaïskos et al.*

► PERSPECTIVE P. 172

## 172 & 194



### REPORTS

#### QUANTUM SYSTEMS

199 Quantum acoustics with superconducting qubits

*Y. Chu et al.*

203 Hanbury Brown and Twiss interferometry of single phonons from an optomechanical resonator

*S. Hong et al.*

#### 206 SURFACE CHEMISTRY

Imaging the halogen bond in self-assembled halogenbenzenes on silver

*Z. Han et al.*

► PERSPECTIVE P. 167

#### 210 PROGRAMMED MATERIALS

Stretchable surfaces with programmable 3D texture morphing for synthetic camouflaging skins

*J. H. Pikul et al.*

► PERSPECTIVE P. 169; VIDEO

#### 215 BIOCATALYSIS

Anti-Markovnikov alkene oxidation by metal-oxo-mediated enzyme catalysis

*S. C. Hammer et al.*

#### 218 ORGANIC SYNTHESIS

Scalable synthesis of bryostatin 1 and analogs, adjuvant leads against latent HIV

*P. A. Wender et al.*

► PERSPECTIVE P. 166

#### 223 CATALYSIS

Aqueous Au-Pd colloids catalyze selective CH<sub>4</sub> oxidation to CH<sub>3</sub>OH with O<sub>2</sub> under mild conditions

*N. Agarwal et al.*

#### 227 MILKY WAY GALAXY

Mapping spiral structure on the far side of the Milky Way

*A. Sanna et al.*

► NEWS STORY P. 160; VIDEO

#### 230 CARBON CYCLE

Tropical forests are a net carbon source based on aboveground measurements of gain and loss

*A. Baccini et al.*

► REMOTE SENSING SECTION P. 186

#### 234 CANCER

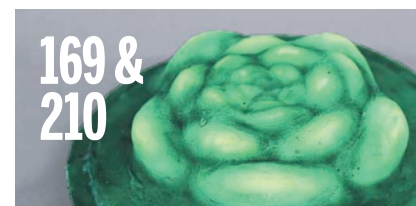
Use of CRISPR-modified human stem cell organoids to study the origin of mutational signatures in cancer

*J. Drost et al.*

#### 238 DISORDERED PROTEINS

Innovative scattering analysis shows that hydrophobic disordered proteins are expanded in water

*J. A. Riback et al.*



## 169 & 210

### DEPARTMENTS

#### 151 EDITORIAL

Rebuilding Caribbean science

By *Juan S. Ramírez and Carlos A. Torres-Ramos*

#### 266 WORKING LIFE

I am a United Academic Worker

By *Brian D. Weitzner*

Science Staff .....	150
New Products .....	242
AAAS Meeting Program .....	243
Science Careers .....	253

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 © 2017 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): \$165 (\$74 allocated to subscription). Domestic institutional subscription (51 issues): \$1659. Foreign postage extra; Mexico, Caribbean (surface mail) \$55; other countries (air assist delivery) \$89. 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: \$23.00 current issue, \$28.00 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 \$35.00 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

**358 (6360)**

*Science* **358** (6360), 151-266.

**ARTICLE TOOLS**

<http://science.sciencemag.org/content/358/6360>

**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.