

A grassroots campaign led to the discovery of PFAS contamination in Michigan's Rogue River and beyond.

## NEWS

### IN BRIEF

**614** News at a glance

### IN DEPTH

**616 VANISHING BERING SEA ICE  
POSES CLIMATE PUZZLE**

For second winter in a row, ice cover shrinks to lowest levels seen in at least 4 decades *By W. Cornwall*

**617 AFRICAN SWINE FEVER MARCHES  
ACROSS MUCH OF ASIA**

Rampant in China, the virus invades neighboring countries, threatening food security *By D. Normile*

**618 EUROPEAN COMMISSION KILLS  
BILLION-EURO FLAGSHIP CONCEPT**

Six candidate research proposals lost in limbo *By K. Kupferschmidt*

**620 FACING PLAN S, PUBLISHERS  
MAY SET PAPERS FREE**

Journals consider offering "green" open access from the time of publication *By J. Brainard*

**621 CLIMATE SCIENTISTS SAY  
NO TO FLYING**

Limiting air travel to reduce carbon footprint works for some, but not all are on board *By K. Langin*

### FEATURES

**622 THEY PERSISTED**

In Michigan, concerned citizens have helped reveal contamination by long-lasting nonstick chemicals *By S. Talpos*  
► PODCAST

## INSIGHTS

### POLICY FORUM

**628 WHEN SCIENCE AND POLITICS  
COLLIDE: ENHANCING THE FDA**

Science-based decisions on drug safety are threatened by political interference *By E. Y. Adashi et al.*

### PERSPECTIVES

**631 PUTTING SUGARS UNDER STRAIN**

Adding strain to sugars enables synthesis of natural products and unusual oligosaccharides *By N. Pohl*  
► REPORTS PP. 674 & 677

**632 ABSOLUTE STRUCTURE,  
AT THE NANOSCALE**

The chirality of a tiny organic crystal is determined with electron diffraction *By H. Xu and X. Zou*  
► REPORT P. 667

**633 RESTORING TUMOR SUPPRESSION**

Restoring enzymatic activity of a tumor suppressor can prevent and treat cancer *By R. Parsons*  
► RESEARCH ARTICLE P. 651

**635 CURBING THE COSTS OF CHEMICAL  
MANUFACTURING**

Renewable feedstocks and fewer process steps can reduce financial and environmental costs *By S. Caille*  
► REPORT P. 681

**636 SENOLYTIC THERAPIES FOR  
HEALTHY LONGEVITY**

Clearing senescent cells with targeted drugs could combat age-associated disease *By J. M. van Deursen*

**638 SYDNEY BRENNER (1927–2019)**

Pioneer of molecular biology and genetics *By C. Kenyon*

### BOOKS ET AL.

**639 AN EXHIBITION FIT FOR A KING**

Towering models, engaging interactives, and virtual reality bring the *Tyrannosaurus rex* to life *By R. Black*



CREDITS (FROM TOP): DASTVAN ET AL.; REX LARSON; DAVIDE BONAZZI/SALZMANART

**640 EXPLOITATION AND EXTRACTION**

A journalist reveals the human cost of modern mining through the vivid story of a young Bolivian mine worker  
By *K. Hudson-Edwards*

**LETTERS****642 FUND U.S. VETERAN TOXIC EXPOSURE DATABASE**

By *D. S. Small*

**642 NEXTGEN VOICES: SUBMIT NOW BRIEF BURNOUT PREVENTION****642 IMPROVING POLITICAL DELIBERATION**

By *N. Castree*

**643 RESPONSE**

By *A. Bächtiger and J. Dryzek*

**RESEARCH****IN BRIEF**

**645** From *Science* and other journals

**REVIEW****648 METAMATERIALS**

Spatiotemporal light control with active metasurfaces *A. M. Shaltout et al.*

REVIEW SUMMARY; FOR FULL TEXT:  
dx.doi.org/10.1126/science.aat3100

**RESEARCH ARTICLES****649 OUTER SOLAR SYSTEM**

Initial results from the New Horizons exploration of 2014 MU<sub>69</sub>, a small Kuiper Belt object *S. A. Stern et al.*

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:  
dx.doi.org/10.1126/science.aaw9771

**650 CELLULAR NEUROSCIENCE**

Local protein synthesis is a ubiquitous feature of neuronal pre- and postsynaptic compartments  
*A.-S. Hafner et al.*

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:  
dx.doi.org/10.1126/science.aau3644

**651 CANCER**

Reactivation of PTEN tumor suppressor for cancer treatment through inhibition of a MYC-WWP1 inhibitory pathway  
*Y.-R. Lee et al.*

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:  
dx.doi.org/10.1126/science.aau0159  
▶ PERSPECTIVE P. 633

**652 NEUROSCIENCE**

Hierarchical reasoning by neural circuits in the frontal cortex  
*M. Sarafyazd and M. Jazayeri*

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:  
dx.doi.org/10.1126/science.aav8911

**653 DEVELOPMENT**

Identification of a regeneration-organizing cell in the *Xenopus* tail  
*C. Aztekin et al.*

**658 PROTEIN DESIGN**

De novo design of tunable, pH-driven conformational changes *S. E. Boyken et al.*

**REPORTS****664 CHEMICAL PHYSICS**

Quantum gas microscopy of Rydberg macromolecules *S. Hollerith et al.*

**667 CHEMICAL STRUCTURE**

Electron diffraction determines molecular absolute configuration in a pharmaceutical nanocrystal  
*P. Brázda et al.*

▶ PERSPECTIVE P. 632

**670 PROBE MICROSCOPY**

Probing and imaging spin interactions with a magnetic single-molecule sensor  
*G. Czaps et al.*

**SUGAR CHEMISTRY**

**674** Conformationally supple glucose monomers enable synthesis of the smallest cyclodextrins *D. Ikuta et al.*

**677** Constrained sialic acid donors enable selective synthesis of  $\alpha$ -glycosides *N. Komura et al.*

▶ PERSPECTIVE P. 631

**681 ORGANIC CHEMISTRY**

Hydrodealkenylative C(sp<sup>3</sup>)-C(sp<sup>2</sup>) bond fragmentation *A. J. Smaligo et al.*

▶ PERSPECTIVE P. 635

**685 NEURODEVELOPMENT**

Single-cell genomics identifies cell type-specific molecular changes in autism  
*D. Velmeshev et al.*

**689 MEMBRANE TRANSPORT**

Mechanism of allosteric modulation of P-glycoprotein by transport substrates and inhibitors *R. Dastvan et al.*

**DEPARTMENTS****613 EDITORIAL**

Two threats to U.S. science  
By *Bruce Alberts and Venkatesh Narayanamurti*

**702 WORKING LIFE**

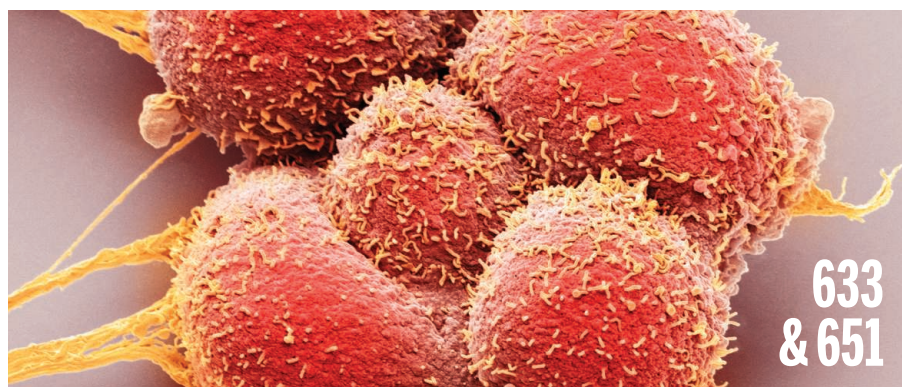
Uncovering the hidden curriculum  
By *Janani Hariharan*

**ON THE COVER**

The Kuiper Belt object 2014 MU<sub>69</sub>, as observed by the New Horizons spacecraft during a high-speed flyby on 1 January 2019. MU<sub>69</sub> is found to be a two-lobed contact binary—formerly separate objects

that have gently merged together. This enhanced-color image shows the uniform red color of both lobes, with brighter material at the contact point. See page 649.  
*Image: NASA/Roman Tkachenko*

Science Staff ..... 610  
New Products..... 696  
Science Careers ..... 697



SCIENCE (ISSN 0036-8075) is published weekly on Friday, except 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. 48446D) paid at Washington, DC, and additional mailing offices. Copyright © 2019 by the American Association for the Advancement of Science. The title SCIENCE is a registered trademark of the AAAS. Domestic individual membership, including subscription (12 months): \$165 (\$74 allocated to subscription). Domestic institutional subscription (51 issues): \$1971; Foreign postage extra: Mexico, Caribbean (surface mail) \$55; other countries (air assist delivery): \$98. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request. GST #R125488122. 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: \$15 each plus shipping and handling, bulk rate on request. Authorization to reproduce material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act can be obtained through the Copyright Clearance Center (CCC), www.copyright.com. 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

**364 (6441)**

*Science* **364** (6441), 613-702.

**ARTICLE TOOLS**

<http://science.sciencemag.org/content/364/6441>

**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.