

# CONTENTS

16 APRIL 2021 • VOLUME 372 • ISSUE 6539

## NEWS

### IN BRIEF

**218** News at a glance

### IN DEPTH

#### **220 Vaccine link to serious clotting disorder firms up**

Rare symptoms found in AstraZeneca recipients occur after Johnson & Johnson shot as well *By K. Kupferschmidt and G. Vogel*

#### **221 Biden proposes a funding surge—and new agencies to manage it**

White House floats three new ARPA-like research offices in 2022 spending request to Congress *By J. Mervis*

#### **222 DNA from cave dirt traces Neanderthal upheaval**

First nuclear DNA from sediment shows turnover, migration among ancient cave dwellers in Spain *By A. Gibbons*  
RESEARCH ARTICLE BY B. VERNOT ET AL.  
10.1126/SCIENCE.ABF1667

#### **223 Lab-grown embryos mix human and monkey cells**

Insights from these chimeras could boost efforts to grow replacement human organs in livestock *By M. Leslie*

#### **224 NAS evaluates ejecting Marcy, Ayala for sexual harassment**

First cases slowly proceeding 2 years after change in academy's bylaws allowed members to be ousted *By M. Wadman*

#### **225 Researchers face attacks from Bolsonaro regime**

Harassment, budget cuts leave many fearing for their jobs and safety *By H. Escobar*

#### **226 Calculation could dim hopes for new physics**

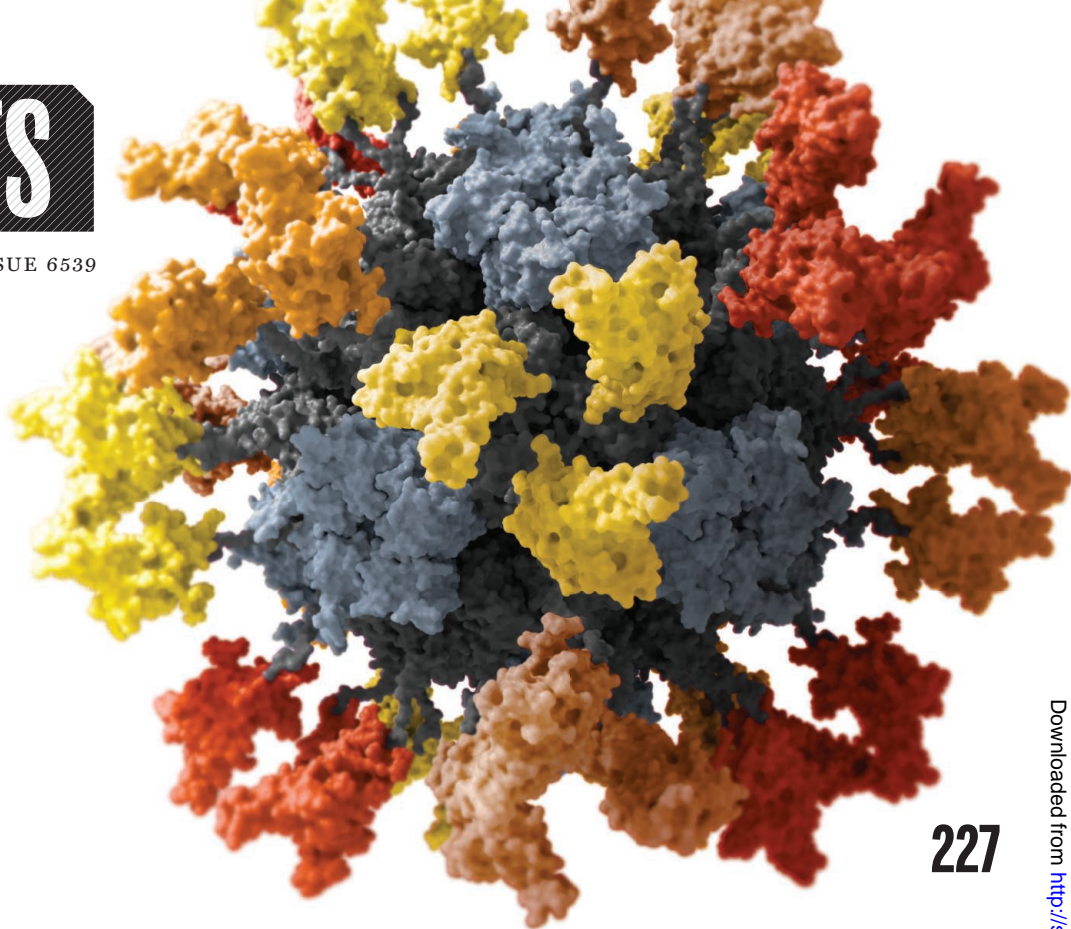
New prediction of muon's magnetism muddies interpretation of tantalizing measurement *By A. Cho*

PODCAST

### FEATURES

#### **227 The dream vaccine**

Why stop at just SARS-CoV-2? Vaccines in development aim to protect against many coronaviruses at once *By J. Cohen*



227

## INSIGHTS

### PERSPECTIVES

#### **232 Preparing for floods on the Third Pole**

Satellite-based real-time monitoring is needed for Himalayan glacial catchments  
*By T. Shukla and I. S. Sen*  
LETTER p. 247

#### **234 The Weyl side of ultracold matter**

Ultracold gases in optical lattices provide control and tunability for the exploration of Weyl semimetal physics  
*By N. Goldman and T. Yefsah*  
RESEARCH ARTICLE p. 271

#### **235 Mosaic synapses in epilepsy**

Mismatch of synaptic cadherins perturbs hippocampal circuitry  
*By B. Shohayeb and H. M. Cooper*  
RESEARCH ARTICLE p. 255

#### **237 Ecological stasis on geological time scales**

Communities and functional structure persist for millions of years in a mammal fauna  
*By P. D. Roopnarine and R. M. W. Banker*  
REPORT p. 300

#### **238 The gut microbiomes of 180 species**

Animal microbiomes are a treasure trove of previously unknown bacteria and genes  
*By A. L. Lind and K. S. Pollard*  
RESEARCH ARTICLE p. 254

#### **239 Diagnosing nutritional stress in the oceans**

Phytoplankton genomes map marine nutrient scarcity *By M. Coleman*  
REPORT p. 287

### POLICY FORUM

#### **241 A water rule that turns a blind eye to transboundary pollution**

We can't presume that states will fill gaps in federal oversight  
*By D. A. Keiser et al.*

### BOOKS ET AL.

#### **245 The cost of scientific patronage**

Military funding encouraged researchers to think of the ocean as a theater of war rather than a dynamic ecosystem  
*By C. Keiner*

#### **246 AI empires**

A Microsoft researcher unpacks the power and perils of today's artificial intelligence *By M. Spezio*

### LETTERS

#### **247 Seismological rockslide warnings in the Himalaya**

*By N. P. Rao et al.*  
PERSPECTIVE p. 232

#### **247 Reimagining aquaculture in the Global South**

*By M. S. Bank et al.*

Downloaded from <http://science.sciencemag.org/> on April 20, 2021

CREDITS: (ILLUSTRATION) Y. ALTOUNIAN/SCIENCE; (DATA) DAVID VEESLER/UW

**248 Weather radars' role in biodiversity monitoring**

By J. Shamoun-Baranes et al.

**249 Technical Comment abstracts**

**RESEARCH**

**IN BRIEF**

**250** From *Science* and other journals

**REVIEW**

**253 Quantum computing**

Materials challenges and opportunities for quantum computing hardware  
N. P. de Leon et al.

REVIEW SUMMARY; FOR FULL TEXT: DOI.ORG/10.1126/SCIENCE.ABB2823

**RESEARCH ARTICLES**

**254 Microbial genomics**

Diversity and functional landscapes in the microbiota of animals in the wild  
D. Levin et al.

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT: DOI.ORG/10.1126/SCIENCE.ABB5352  
PERSPECTIVE p. 238

**255 Neurodevelopment**

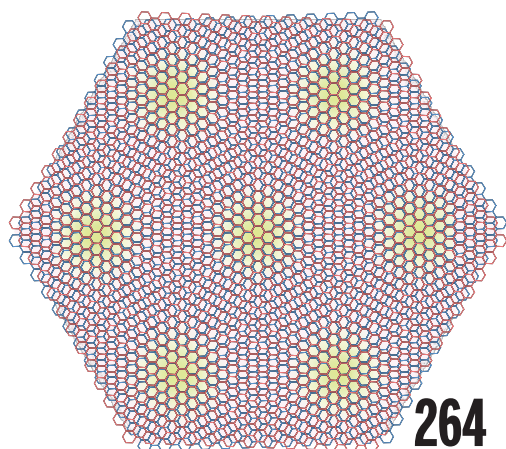
Female-specific synaptic dysfunction and cognitive impairment in a mouse model of PCDH19 disorder  
N. Hoshina et al.

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT: DOI.ORG/10.1126/SCIENCE.AAZ3893  
PERSPECTIVE p. 235

**256 Coronavirus**

SARS-CoV-2 within-host diversity and transmission  
K. A. Lythgoe et al.

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT: DOI.ORG/10.1126/SCIENCE.ABG0821



**257 Gut physiology**

An intercrypt subpopulation of goblet cells is essential for colonic mucus barrier function  
E. E. L. Nyström et al.

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT: DOI.ORG/10.1126/SCIENCE.ABB1590

**258 Neuroscience**

Neuropixels 2.0: A miniaturized high-density probe for stable, long-term brain recordings  
N. A. Steinmetz et al.

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT: DOI.ORG/10.1126/SCIENCE.ABF4588

**259 Quantum networks**

Realization of a multinode quantum network of remote solid-state qubits  
M. Pompili et al.

**264 2D materials**

Nematicity and competing orders in superconducting magic-angle graphene  
Y. Cao et al.

**271 Quantum simulation**

Realization of an ideal Weyl semimetal band in a quantum gas with 3D spin-orbit coupling  
Z.-Y. Wang et al.

PERSPECTIVE p. 234

**REPORTS**

**276 Magnetism**

Gapped magnetic ground state in quantum spin liquid candidate  $\kappa$ -(BEDT-TTF)<sub>2</sub>Cu<sub>2</sub>(CN)<sub>3</sub>  
B. Mijsch et al.

**280 Fire ecology**

Carbon loss from boreal forest wildfires offset by increased dominance of deciduous trees  
M. C. Mack et al.

VIDEO

**284 Paleontology**

Absolute abundance and preservation rate of *Tyrannosaurus rex*  
C. R. Marshall et al.

PODCAST

**287 Ocean microbiology**

Metagenomic analysis reveals global-scale patterns of ocean nutrient limitation  
L. J. Ustick et al.

PERSPECTIVE p. 239

**292 Signal transduction**

Decoupling transcription factor expression and activity enables dimmer switch gene regulation  
C. Ricci-Tam et al.

**296 Membranes**

Ion-capture electro dialysis using multifunctional adsorptive membranes  
A. A. Uliana et al.

**300 Paleontology**

Punctuated ecological equilibrium in mammal communities over evolutionary time scales  
F. Blanco et al.

PERSPECTIVE p. 237

**DEPARTMENTS**

**217 Editorial**

Scientists' lanes and headwinds  
By H. Holden Thorp

**310 Working Life**

Finding my online voice  
By Suhas Eswarappa Prameela



Downloaded from <http://science.sciencemag.org/> on April 20, 2021

**ON THE COVER**

*Tyrannosaurus rex* prowl a Cretaceous coast. By using the rich fossil record of *T. rex*, including its body mass, growth and survivorship curves, geographic range, and geologic longevity, together with the relationship between population density and body mass among living animals, it is possible to ascertain how many *T. rex* ever roamed the planet and to estimate the fossil recovery rate for this species. See page 284.



Illustration: Julius Csotonyi

New Products..... 304  
Science Careers..... 305

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. 484460) paid at Washington, DC, and additional mailing offices. Copyright © 2021 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): \$2148; Foreign postage extra: \$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 available from backissues.sciencemag.org; 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

**372 (6539)**

*Science* **372** (6539), 217-310.

**ARTICLE TOOLS**

<http://science.sciencemag.org/content/372/6539>

**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 © 2021 The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works.