

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

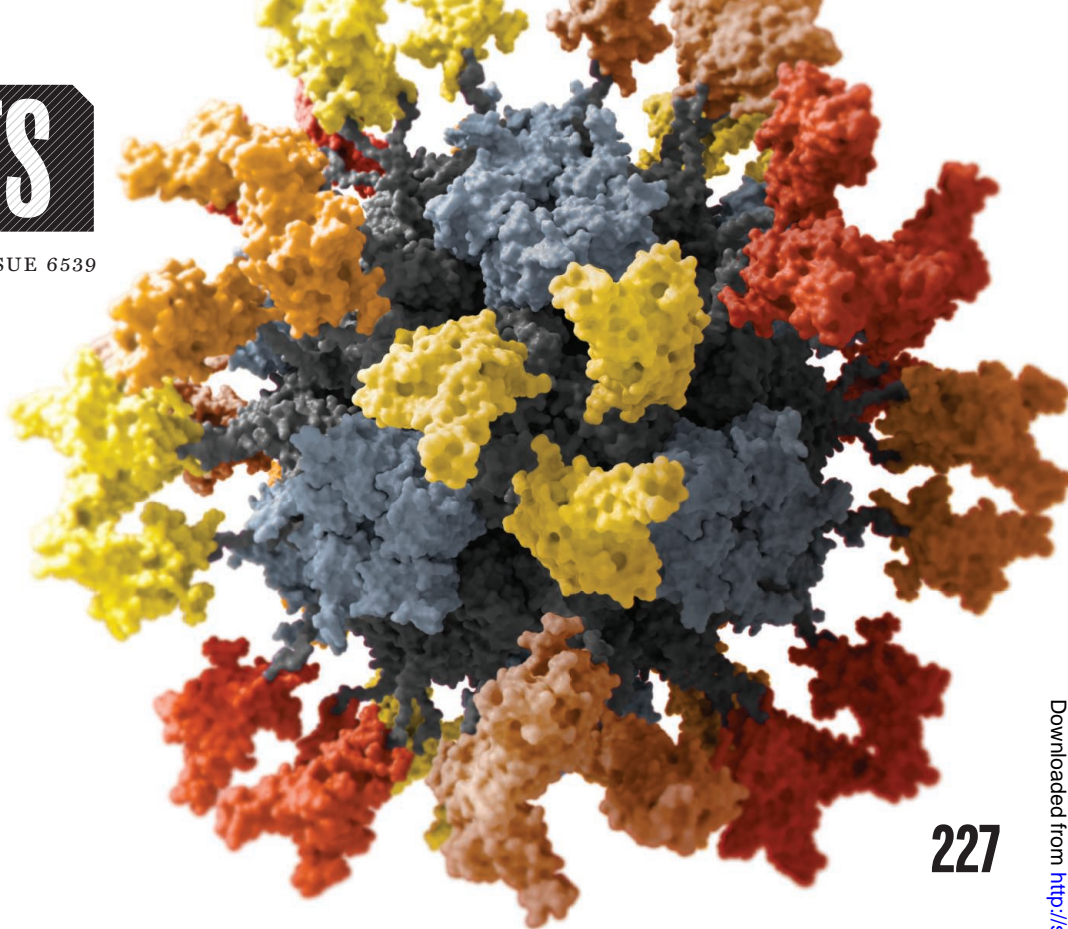
New prediction of muon's magnetism muddies interpretation of tantalizing measurement *By A. Cho*

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 19, 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

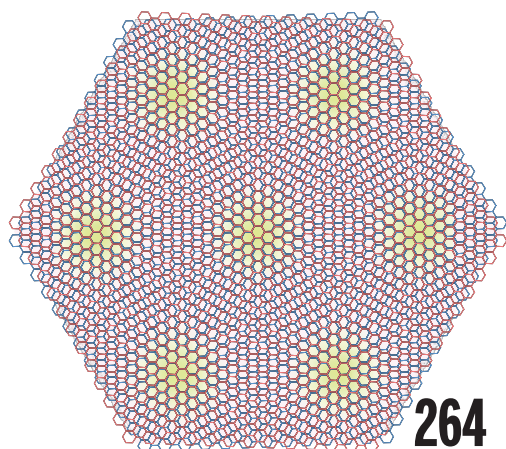
Female-specific synaptic dysfunction and cognitive impairment in a mouse model of PCDH19 disorder
N. Hoshina et al.

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 κ -(BEDT-TTF)₂Cu₂(CN)₃
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 19, 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: 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 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.