# CONTENTS

14 AUGUST 2025
VOLUME 389
ISSUE 6761

**676**
The human bone marrow cells within this chip could make it better than a lab animal at predicting adverse drug reactions.

## EDITORIAL

**667 Scientists' role in defending democracy**
—G. Goldman and E. Chenowith

## NEWS

**668 NIH weighs controversial overhaul of HIV budget**
Scientists worry $1 billion push for "implementation science" will harm basic research —J. Cohen

**670 Twist on PET unlocks hidden signals**
Overlooked emissions from exotic positronium atoms open unexpected window for diagnosing cancer and other diseases —Z. Savitsky

**672 Correction in *Science* rekindles debate over Microsoft's quantum computing research**
Disputes over elusive Majorana particles—the hoped-for key to robust quantum chips—continue to divide the field —A. Mann

**673 Europe eyes civilian science funding for defense research**
Worried about regional security, the EU wants to allow major grants to fund "dual-use" projects for the first time —E. Cutts

**675 Trump moves to politicize decisions on science grants**
Researchers say plan would enable political operatives to overrule peer reviewers
—J. Mervis

### FEATURES

**676 Beyond lab animals**
With a boost from the Trump administration, organ chips, AI, and other technologies bid to replace animals for drug and chemical testing —S. Reardon
PODCAST

## COMMENTARY

### PERSPECTIVES

**680 The scent of a crowd**
Maize plants recruit immunity-modulating soil microbes in response to high-density planting
—N. Schandry and C. Becker
RESEARCH SUMMARY p. 698

**682 Seeing with atoms**
A beam of neutral atoms penetrates a solid material to probe its properties —B. Holst
RESEARCH ARTICLE p. 724

**683 The ins and outs of circulating DNA**
DNA sequestered in circulating platelets could inform early tumor diagnosis —W. H. A. Tsui and Y. M. D. Lo
RESEARCH SUMMARY p. 702

**684 Setting the table for immune tolerance**
Interaction between breast milk antibodies and gut microbes shape immune responses during weaning
—M. Silverman and K. Knoop
RESEARCH SUMMARY p. 703

**685 Mitochondria hoard folate to starve a parasite**
Metabolic immunity contributes to cells' defenses against *Toxoplasma gondii* —A. Suomalainen and J. Nikkanen
RESEARCH SUMMARY p. 701

### POLICY FORUM

**687 Climate-smart biofuel policy as a pathway to decarbonize agriculture**
A policy that relies on farm-specific carbon-intensity scores can promote climate-smart agricultural practices
—M. Khanna *et al.*

**680 & 698**

PHOTOS: (TOP TO BOTTOM) WYSS INSTITUTE AT HARVARD UNIVERSITY; MATTHIJS WETTERAUW/ALAMY

## BOOKS ET AL.

**690 Leading a lab, and all it entails**
A chemist offers actionable leadership advice to principal investigators —J. Wai

**691 The Sisyphean quest for scientific certainty**
An epidemiologist calls for humility and triangulation to converge on truth —S. M. S. Krammer

## LETTERS

**692 Editor's note** —H. H. Thorp

**692 Risks of ending US science-policy training**
—S. Glaberman and C. Wei

**693 Addressing Southeast Asia's plastic pollution**
—T. Xayachak *et al.*

**694 West Philippine Sea dispute threatens sea life**
—A. A. Mabalay

# RESEARCH

## HIGHLIGHTS

**695** From *Science* and other journals

## RESEARCH SUMMARIES

**698 Plant communication**
Linalool-triggered plant-soil feedback drives defense adaptation in dense maize plantings —D. Guo *et al.*
PERSPECTIVE p. 680

**699 Optical materials**
Hierarchical chiral supramolecular assemblies with strong and invertible chiroptical properties —M. Kim *et al.*

**700 Protein simulations**
Scalable emulation of protein equilibrium ensembles with generative deep learning —S. Lewis *et al.*

**701 Cell biology**
Mitochondria protect against an intracellular pathogen by restricting access to folate —T. C. Medeiros *et al.*
PERSPECTIVE p. 685

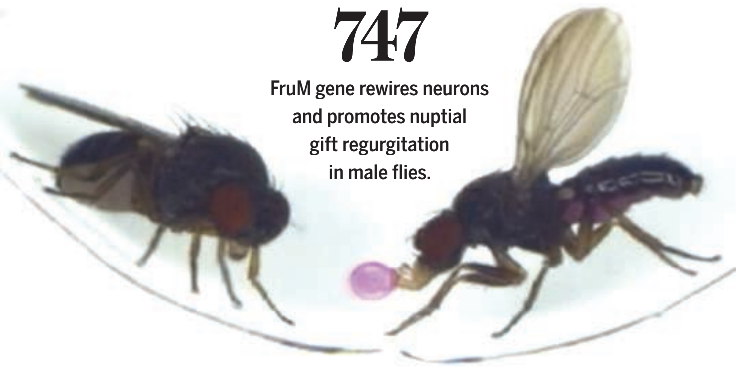
**702 Platelets**
Platelets sequester extracellular DNA, capturing tumor-derived and free fetal DNA —L. Murphy *et al.*
PERSPECTIVE p. 683

**703 Immunology**
Breast milk IgG engages the mouse neonatal immune system to instruct responses to gut antigens —M. K. Shenoy *et al.*
PERSPECTIVE p. 684

## RESEARCH ARTICLES

**704 Ancient proteins**
The proteome of the late Middle Pleistocene Harbin individual —Q. Fu *et al.*

**708 Carbon allotropes**
Solution-phase stabilization of a cyclocarbon by catenane formation —Y. Gao *et al.*



**747**
FruM gene rewires neurons and promotes nuptial gift regurgitation in male flies.

PHOTO: TANAKA *ET AL.*

**711 Methanogenesis**
Modulation of methyl–coenzyme M reductase expression alters the isotopic composition of microbial methane —J. Gropp *et al.*

**716 Many-body dynamics**
Observation of many-body dynamical localization —Y. Guo *et al.*

**720 Fungal genetics**
Early germline sequestration in a basidiomycete fungus —M. Hiltunen Thorén *et al.*

**724 Structural methods**
Diffraction of helium and hydrogen atoms through single-layer graphene —C. Kanitz *et al.*
PERSPECTIVE p. 682

**727 Nuclear fusion**
Predicting fusion ignition at the National Ignition Facility with physics-informed deep learning —B. K. Spears *et al.*

**732 Biocatalysis**
Artificial farnesol epoxidase enables a concise synthesis of meroterpenoids —J. Wang *et al.*

**736 2D materials**
Strong interactions and isospin symmetry breaking in a supermoiré lattice —Y. Xie *et al.*

**741 Biocatalysis**
Enantioconvergent benzylic C(sp$^3$)–N coupling with a copper-substituted nonheme enzyme —X. Shen *et al.*

**747 Evolutionary biology**
Cross-species implementation of an innate courtship behavior by manipulation of the sex-determinant gene —R. Tanaka *et al.*

# WORKING LIFE

**754 How I learned to ride**
—E. Hamzehpoor

**666** *Science* Staff
**753** *Science* Careers

## ON THE COVER

Predicting how biomolecules function requires understanding not just their sequence and structure but also their dynamic motions; yet, scalable methods for exploring these motions have been lacking. BioEmu is a deep learning system that rapidly generates diverse protein conformations, enabling fast, accurate insights into protein flexibility and function. This image shows an overlay of protein structures of a cyclic di–guanosine monophosphate receptor module sampled by BioEmu. See page 700. Illustration: N. Burgess/*Science*; Data: S. Lewis *et al.*, *Science* **389**, eadv9817 (2025).

## ON THE PODCAST

Why chatbots lie, and can synthetic organs and AI replace animal testing?

***Science* serves as a forum for discussion of important issues related to the advancement of science by publishing material on which a consensus has been reached as well as including the presentation of minority or conflicting points of view. Accordingly, all articles published in *Science*—including editorials, news, commentary, and book reviews—are signed and reflect the individual views of the authors and not official points of view adopted by AAAS or the institutions with which the authors are affiliated.** *Science* (ISSN 0036-8075) is published weekly on Thursday, 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 © 2025 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): $2865; Foreign postage extra: Air assist delivery: $135. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request, GST #125488122. 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.science.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.