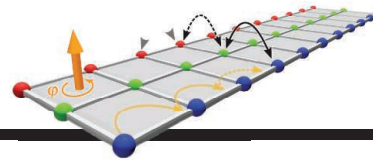


# CONTENTS



## 1450, 1510, & 1514

Edge states in a quantum gas

25 SEPTEMBER 2015 • VOLUME 349 • ISSUE 6255



SPECIAL SECTION

## MUTATION AND HUMAN DISEASE

### INTRODUCTION

**1470** Hunting mutations, targeting disease

### NEWS

**1472** Can 23andMe have it all?

*By K. Servick*

**1475** Who has your DNA—or wants it

*By J. Kaiser*

### REVIEWS

**1478** The origins, determinants, and consequences of human mutations

*J. Shendure and J. M. Akey*

**1483** Somatic mutation in cancer and normal cells

*I. Martincorena and P. J. Campbell*

**1489** Genetics and genomics of psychiatric disease

*D. H. Geschwind and J. Flint*

**1494** Mutations causing mitochondrial disease: What is new and what challenges remain?

*R. N. Lightowlers et al.*

### ON THE COVER



Results of an early next-generation DNA sequencing run show four superimposed false-color images of amplified DNA clusters from one

of the hundreds of “tiles” contained on a glass flow cell. Recent advances in this increasingly popular and inexpensive method now enable parallel sequencing reactions that can produce up to 500 gigabases of data per instrument run. These data allow us to better understand the frequency of genetic mutations and their impact on human disease. See page 1470. *Image: Jamie Simon, Ryan Lister, and Joseph R. Ecker, The Salk Institute*

SEE ALSO ▶ EDITORIAL P. 1423 ▶ NEWS STORY P. 1433 ▶ PERSPECTIVE P. 1449 ▶ BOOKS ET AL. P. 1456

### 1433 NIH OPENS PRECISION MEDICINE STUDY TO NATION

Panel’s plan would allow anyone living in the United States to join million-strong effort *By J. Kaiser*

▶ MUTATION AND HUMAN DISEASE SECTION P. 1470

### 1434 CHINA’S ISLAND BUILDING IS DESTROYING REEFS

New land in the South China Sea comes at the expense of corals and fisheries

*By C. Larson*

### 1435 THE MARTIAN’S ODE TO SCIENCE

The director, author, and a NASA expert on how they balanced realism and movie magic *By M. Sachdev*

### FEATURES

#### 1436 ECOLOGY’S TOUGH CLIMB

NSF’s ambitious network of observatories runs into harsh budget and management realities *By J. Mervis*

#### 1440 Tragic end for Puerto Rico site

*By J. Mervis*

#### 1441 NEON jobs plentiful but problematic

*By J. Mervis*

## INSIGHTS

### PERSPECTIVES

#### 1444 EXTREME WEATHER, MADE BY US?

Individual climate events cannot be attributed to anthropogenic climate change *By A. R. Solow*

#### 1446 FEMALE GENITAL CUTTING IS NOT A SOCIAL COORDINATION NORM

New data from Sudan question an influential approach to reducing female genital cutting *By C. Efferson et al.*

#### 1448 GATA GET A HOLD ON SENESCENCE

A transcription factor’s abundance connects autophagy to cellular senescence and a secretory phenotype *By L. D. Cassidy and M. Narita*

▶ RESEARCH ARTICLE P. 1503

Science Staff.....	1418
AAAS News & Notes.....	1465
Gordon Research Conferences.....	1554
New Products.....	1567
Science Careers.....	1568

## NEWS

### IN BRIEF

**1426** Roundup of the week’s news

### IN DEPTH

#### 1430 SLEUTHING SHEDS LIGHT ON STAP CELL FIASCO

Researchers describe artifacts that could have misled authors and prompted sensational reprogramming claims *By G. Vogel*

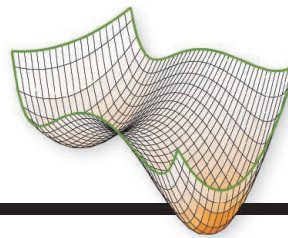
#### 1431 HOW TEETH GOT TOUGH: ENAMEL’S EVOLUTIONARY JOURNEY

A new analysis of fossils shows that ancient fish scales and skull bones sported enamel long before this hard substance coated teeth *By S. Perkins*

#### 1432 SCRIPPS HOOKS PROMINENT PAIR TO LEAD IT TO HEALTH

Steve Kay and Peter Schultz aim to focus one of the world’s largest basic biomedical science powerhouses on translational medicine *By R. F. Service*

PHOTO: © PHIL NOBLE/REUTERS



## 1449 MITOCHONDRIAL-NUCLEAR DNA MISMATCH MATTERS

Could different nuclear DNA-mitochondrial DNA combinations affect disease severity?

By *K. J. Dunham-Snary and S. W. Ballinger*

► MUTATION AND HUMAN DISEASE

SECTION P. 1470; PODCAST

## 1450 PROBING THE EDGE WITH COLD ATOMS

Trapped atoms can mimic the nature of edge currents in quantum Hall systems

By *A. Celi and L. Tarruell*

► REPORTS PP. 1510 & 1514

## 1452 EXPANDING THE CHEMICAL SPACE FOR REDOX FLOW BATTERIES

Flow batteries offer low-cost electricity storage for grid-scale renewable power sources

By *M. L. Perry*

► REPORT P. 1529

## BOOKS ET AL.

### 1455 NEUROTRIBES

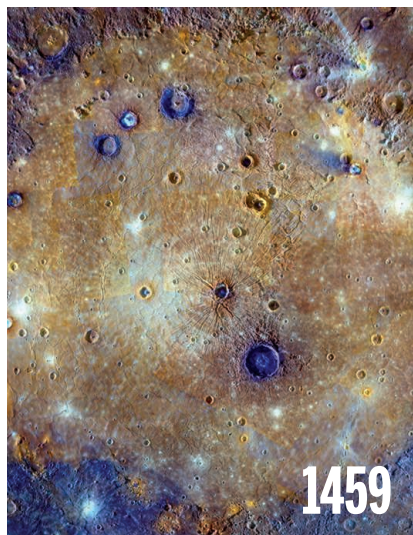
By *S. Silberman*, reviewed by *F. Happé*

### 1456 GENOMIC MESSAGES

By *G. Annas and S. Elias*, reviewed by *H. T. Greely*

► MUTATION AND HUMAN DISEASE

SECTION P. 1470



## LETTERS

### 1459 MERCURY AND THE MOON

By *L. L. Hood*

### 1459 EMISSIONS REDUCTION IS NOT ENOUGH

By *G. H. Rau and C. H. Greene*

### 1459 RESEARCH FRAUD AS TORT

By *E. Guerra-Pujol*

### 1460 TECHNICAL COMMENT ABSTRACTS

## RESEARCH

### IN BRIEF

1500 From *Science* and other journals

### RESEARCH ARTICLES

#### 1503 AGING

The DNA damage response induces inflammation and senescence by inhibiting autophagy of GATA4

By *C. Kang et al.*

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:

[dx.doi.org/10.1126/science.aaa5612](http://dx.doi.org/10.1126/science.aaa5612)

► PERSPECTIVE P. 1448

#### 1504 PROTEIN FOLDING

Structural origin of slow diffusion in protein folding

By *H. S. Chung et al.*

### REPORTS

#### QUANTUM SIMULATION

1510 Observation of chiral edge states with neutral fermions in synthetic Hall ribbons

By *M. Mancini et al.*

1514 Visualizing edge states with an atomic Bose gas in the quantum Hall regime

By *B. K. Stuhl et al.*

► PERSPECTIVE P. 1450

#### 1518 NANOMATERIALS

Atomically thin two-dimensional organic-inorganic hybrid perovskites

By *L. Dou et al.*

#### 1522 ASTROPHYSICS

Gravitational waves from binary supermassive black holes missing in pulsar observations

By *R. M. Shannon et al.*

#### 1525 BIOCATALYSIS

Conversion of alcohols to enantiopure amines through dual-enzyme hydrogen-borrowing cascades

By *F. G. Mutti et al.*

#### 1529 BATTERIES

Alkaline quinone flow battery

By *K. Lin et al.*

► PERSPECTIVE P. 1452

#### 1532 H-BONDING CATALYSIS

O-H hydrogen bonding promotes H-atom transfer from  $\alpha$  C-H bonds for C-alkylation of alcohols

By *J. L. Jeffrey et al.*

#### 1537 PALEOCEANOGRAPHY

Synchronous centennial abrupt events in the ocean and atmosphere during the last deglaciation

By *T. Chen et al.*

#### 1541 EVOLUTIONARY ECOLOGY

Functional mismatch in a bumble bee pollination mutualism under climate change

By *N. E. Miller-Struttman et al.*

#### 1544 MITOCHONDRIAL IMPORT

Molecular architecture of the active mitochondrial protein gate

By *T. Shiota et al.*

#### 1549 TRANSPOSONS

Arrested replication forks guide retrotransposon integration

By *J. Z. Jacobs et al.*

## DEPARTMENTS

### 1423 EDITORIAL

Preimplantation genetic screens

By *Arthur L. Beaudet*

► MUTATION AND HUMAN DISEASE

SECTION P. 1470

### 1578 WORKING LIFE

How science fairs shaped my career

By *Rachel Yoho*

# Science

**349 (6255)**

*Science* **349** (6255), 1423-1578.

**ARTICLE TOOLS**

<http://science.sciencemag.org/content/349/6255>

**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.