

CONTENTS

29 March 2018 / Vol 555 / Issue No 7698

THIS WEEK

EDITORIALS

559 HISTORY

Use and abuse of ancient DNA

Researchers must tread carefully when attempting to interpret the past

559 PRIVACY

Digital trust

Consider the wider ethics when accessing and analysing data

560 FOOD

Burger *al funghi*

Beef-mushroom blends can tackle health and environmental issues

WORLD VIEW



561 Drug executives should take a Hippocratic oath

Bob More
Industry must prove that the high costs of new treatments are justified

RESEARCH HIGHLIGHTS

562 SELECTIONS FROM THE SCIENTIFIC LITERATURE

Glacier loss / Star nurseries / Volcanic thunder / Bat flight / Sludge microbes

SEVEN DAYS

564 THE NEWS IN BRIEF



Weather expenses / Yellow fever / Whale stranding / Paris campus

CAREERS

689 LAB LIFE

How laughter in the lab can improve your science

Humour can lift spirits and boost productivity

691 CAREER BRIEFS

NEWS IN FOCUS

567 NEUROSCIENCE

Colombia researchers zero in on Alzheimer's target

569 MATERIALS SCIENCE

Four-in-one printer paves way for custom robots

569 ENVIRONMENT

Forecasters aim to predict damaging plankton blooms in Arabian Sea

570 MEDICINE

Clinical trial of reduced calories shows promise in slowing down ageing

571 EXTRASOLAR PLANETS

European mission to study exoplanets

572 POLITICS

US government spending on science hits historic high

FEATURE



HISTORY

Divided over DNA

Archaeologists and geneticists work to reconcile their views of the past

PAGE 573

SPOTLIGHTS

569 SWEDEN

Science diversified

Swedish science is bouncing back

571 Q&A

Physics to fertility

Elina Berglund talks about career shifts

572 MEDICON VALLEY

Crossing borders

A hub emerges spanning Sweden and Denmark

COMMENT



DIVERSITY

Security women

Online safeguarding requires a broader range of skills and experiences, says Winifred R Poster PAGE 577

BOOKS & ARTS

581 PHYSICS

A life of scientific delight

Ann Finkbeiner

582 PHYSICS

Quantum-theory wars

Ramin Skibba

583 BOOKS IN BRIEF

584 IN RETROSPECT

2001: A Space Odyssey

Piers Bizony

CORRESPONDENCE

587 Climate and conflict / Lab contamination / Digital intelligence

OBITUARY

588 John Sulston (1942–2018)

Georgina Ferry

FUTURES

694 Starless night

Andrew Johnston



CONTENTS

29 March 2018 / Vol 555 / Issue No 7698

RESEARCH

NEW ONLINE

589 Papers published this week at nature.com

NEWS & VIEWS

590 PLANETARY SCIENCE

Oceans on Mars formed early

An explanation for the geometry of Mars's putative ancient shorelines
Maria T Zuber [SEE LETTER P.643](#)

591 SENSORY SYSTEMS

A trio of ion channels takes the heat

Three TRP channels mediate noxious heat sensing
Rose Z Hill & Diana M Bautista
[SEE LETTER P.662](#)

592 CHEMISTRY

AI designs organic syntheses

A program that infers its own rules for synthetic organic chemistry
Derek Lowe [SEE ARTICLE P.604](#)

594 MATERIALS SCIENCE

Wing origami

Origami-based design inspired by the wings of earwigs
Ryan Wilkinson

594 IMMUNOLOGY

Killer T cells show their kinder side

T cells respond to commensal bacteria by expressing tissue-repair factors
Paul Klenerman & Graham Ogg

595 METABOLISM

The healthy diabetic cavefish conundrum

Cavefish have a mutation in the insulin receptor and high blood glucose
Sylvie Rétaux [SEE LETTER P.647](#)

597 CARDIOLOGY

The tornadoes of sudden cardiac arrest

Visualization of electromechanical scroll waves in the heart
José Jalife [SEE LETTER P.667](#)

ARTICLES

599 QUANTUM PHYSICS A coherent spin-photon interface in silicon

X Mi et al.

604 CHEMISTRY Planning chemical syntheses with deep neural networks and symbolic AI

M H S Segler, M Preuss & M P Waller
[SEE N&V P.592](#)



ON THE COVER

Staying alive

Blind Mexican cavefish (*Astyanax mexicanus*) live in dark caves where food is scarce. Their famine-and-feast lifestyle has led the fish to evolve a mutation in the insulin receptor that would cause type 2 diabetes in humans but seems harmless to the fish. The adapted glucose-regulation mechanism might allow the fish to survive in their challenging environment. [PAGES 595 & 647](#)

611 GENETICS De novo mutations in regulatory elements in neurodevelopmental disorders

P J Short et al.

617 NEUROSCIENCE Encoding of danger by parabrachial CGRP neurons

C A Campos, A J Bowen, C W Roman & R D Palmiter

623 MICROBIOLOGY Extensive impact of non-antibiotic drugs on human gut bacteria

L Maier et al.

LETTERS

629 ASTRONOMY A galaxy lacking dark matter

P van Dokkum et al.

633 QUANTUM PHYSICS A programmable two-qubit quantum processor in silicon

T F Watson et al.

638 CONDENSED-MATTER PHYSICS Massive Dirac fermions in a ferromagnetic kagome metal

L Ye et al.

643 PLANETARY SCIENCE Timing of oceans on Mars from shoreline deformation

R I Citron, M Manga & D J Hemingway
[SEE N&V P.590](#)

647 METABOLISM Insulin resistance in cavefish as an adaptation to a nutrient-limited environment

M R Riddle et al. [SEE N&V P.595](#)

652 EVOLUTION Reconstructing the genetic history of late Neanderthals

M Hajdinjak et al.

657 IMAGING TECHNIQUES Moving magnetoencephalography towards real-world applications with a wearable system

E Boto et al.

662 SENSORY SYSTEMS A TRP channel trio mediates acute noxious heat sensing

I Vandewauw et al. [SEE N&V P.591](#)

667 CARDIOLOGY Electromechanical vortex filaments during cardiac fibrillation

J Christoph et al. [SEE N&V P.597](#)

673 METABOLISM Hepatocyte-secreted DPP4 in obesity promotes adipose inflammation and insulin resistance

D S Ghorpade et al.

678 CANCER The protein histidine phosphatase LHPP is a tumour suppressor

S K Hindupur et al.

683 BIOTECHNOLOGY Optogenetic regulation of engineered cellular metabolism for microbial chemical production

E M Zhao et al.

688 ERRATUM Non-adaptive plasticity potentiates rapid adaptive evolution of gene expression in nature

C K Ghahramani et al.

IMAGING TECHNIQUES

Active images

A wearable MEG system allows brain imaging during movement. [PAGE 657](#)



COVER IMAGE: PAULO OLIVEIRA/ALAMY