

# CONTENTS

30 July 2015 / Vol 523 / Issue No 7562

## THIS WEEK

### EDITORIALS

#### 501 ENVIRONMENTAL SCIENCE

##### Tropical protection

The palm-oil industry must start acting on environmental-protection pledges

#### 501 BIOSECURITY

##### Secret service

US government labs need more transparent oversight

#### 502 OUTBREAKS

##### Realistic risks

Infectious diseases will remain a threat until society assesses risks properly

### WORLD VIEW

#### 503 Faith and science can find common ground

David M Lodge

The Pope is well placed to bridge the gap between science and religion

### RESEARCH HIGHLIGHTS

#### 504 SELECTIONS FROM THE SCIENTIFIC LITERATURE

Qubits controlled / Death by boa / Miniature stomachs / Reporting a null result / Origami goes large / The most distant galaxy yet



### SEVEN DAYS

#### 506 THE NEWS IN BRIEF

Japan space agency issues call for asteroid names / UK eases pesticide ban / Head of BGI steps down

## CAREERS

#### 627 EXTRAMURAL WORK

##### To serve or not to serve

The pitfalls and benefits of serving on committees

#### 629 TURNING POINT

Working on a US-wide project is time consuming, but worth it, says postdoc ecologist Heather Schneider

## NEWS IN FOCUS



#### 509 DRUG DEVELOPMENT

Alzheimer's drugs start to show success

#### 510 GLACIOLOGY

NASA launches six-year air-and-water project to study Greenland's fjords

#### 511 PLANETARY SCIENCE

Kepler telescope finds world with conditions that could support life

#### 512 ANTHROPOLOGY

Neanderthal genes shaped human biology

#### 513 POLITICS

Deadline looms for US budget deal

#### 514 COSMOLOGY

Observatory to spy on teenage Universe

## FEATURES



### EVIDENCE-BASED MEDICINE

## Checklists in trouble

Pre-surgery checks have had mixed success in saving lives **PAGE 516**

#### 520 STEM-CELL MEDICINE

##### Rise of the organoids

Mini kidneys, livers, brains and guts are teaching biologists about development

## COMMENT

#### 523 HISTORY

##### From blackboards to bombs

David Kaiser

The surprising legacy of the 'physicists' war'

#### 526 POLICY

##### Define biomass sustainability

Roeland Bosch, Mattheüs van de Pol & Jim Philp

The world needs to agree on key criteria for prioritization in the bioeconomy

## BOOKS & ARTS



#### 528 HOLIDAY READING

##### Summer books

Nature regulars share their getaway picks — and there's more online

## CORRESPONDENCE

531 Palaeo-tourism in South Africa / Tree rings and climate / Teaching evolution / Socially responsible universities

## OBITUARY

#### 532 Irwin Allan Rose (1926–2015)

Keith Wilkinson & Avram Hershko

## FUTURES

632 The shoulder of Orion  
Eric Garside





# CONTENTS

30 July 2015 / Vol 523 / Issue No 7562

## RESEARCH

### NEW ONLINE

533 Papers published this week at nature.com

### NEWS & VIEWS

#### 534 SUSTAINABILITY

##### Bypassing the methane cycle

A high-starch, low-methane transgenic rice variety  
Paul L E Bodelier **SEE LETTER P.602**

#### 535 INORGANIC CHEMISTRY

##### Movies of a growth mechanism

Real-time observations of crystallizing metal-organic frameworks  
Krista S Walton

#### 536 MATERIALS SCIENCE

##### Composite for energy storage takes the heat

A composite material acts as a high-temperature dielectric  
Harry J Ploehn **SEE LETTER P.576**

#### 538 STRUCTURAL BIOLOGY

##### Arresting developments in receptor signalling

The structure of the GPCR rhodopsin in complex with arrestin-1  
Jeffrey L Benovic **SEE ARTICLE P.561**

#### 539 GENETICS OF DISEASE

##### Associations with depression

Genetic associations with major depressive disorder in Chinese women  
Patrick F Sullivan **SEE LETTER P.588**

#### 540 OPHTHALMOLOGY

##### Cataracts dissolved

Lanosterol may offer a non-surgical treatment for cataracts  
J Fielding Hejtmancik **SEE LETTER P.607**

#### 541 STRONG-FIELD PHYSICS

##### Harmonic radiation from crystals

Tunnelling electrons in a crystal interfere and drive light emission  
Peter Hommelhoff & Takuya Higuchi  
**SEE LETTER P.572**

### ARTICLES

543 **GEOCHEMISTRY** Timing and climate forcing of volcanic eruptions for the past 2,500 years  
M Sigl et al.

550 **MICROBIOLOGY** Metabolic co-dependence gives rise to collective oscillations within biofilms  
J Liu et al.



ON THE COVER

## Cellular power grid

Electrically conductive mitochondria in skeletal muscle. High-resolution microscopy shows that as well as generating energy, mitochondria have a role in its distribution, forming a conductive pathway throughout the cell in the form of a proton motive force. This network is potentially rapid enough to enable muscle to respond almost instantaneously to new energy demands. **PAGE 617**

555 **STRUCTURAL BIOLOGY** Biogenesis and structure of a type VI secretion membrane core complex  
E Durand et al.

561 **STRUCTURAL BIOLOGY** Crystal structure of rhodopsin bound to arrestin by femtosecond X-ray laser  
Y Kang et al. **SEE N&V P.538**

### LETTERS

568 **SPACE PHYSICS** Magnetospherically driven optical and radio aurorae at the end of the stellar main sequence  
G Hallinan et al.

572 **QUANTUM PHYSICS** Real-time observation of interfering crystal electrons in high-harmonic generation  
M Hohenleutner et al. **SEE N&V P.541**

576 **POLYMER CHEMISTRY** Flexible high-temperature dielectric materials from polymer nanocomposites  
Q Li et al. **SEE N&V P.536**

580 **PALAEOCEANOGRAPHY** Onset of Antarctic Circumpolar Current 30 million years

ago as Tasmanian Gateway aligned with westerlies  
H D Scher et al.

584 **PALAEONTOLOGY** A Middle Triassic stem-turtle and the evolution of the turtle body plan  
R R Schoch & H-D Sues

588 **GENETICS** Sparse whole-genome sequencing identifies two loci for major depressive disorder  
CONVERGE consortium **SEE N&V P.539**

592 **NEUROSCIENCE** Impermanence of dendritic spines in live adult CA1 hippocampus  
A Attardo, J E Fitzgerald & M J Schnitzer

597 **STEM CELLS** Parent stem cells can serve as niches for their daughter cells  
A Pardo-Saganta et al.

602 **PLANT BREEDING** Expression of barley SUSIBA2 transcription factor yields high-starch low-methane rice  
J Su et al. **SEE N&V P.534**

607 **VISION DISORDERS** Lanosterol reverses protein aggregation in cataracts  
L Zhao et al. **SEE N&V P.540**

612 **IMMUNOLOGY** T-cell exhaustion, co-stimulation and clinical outcome in autoimmunity and infection  
E F McKinney, J C Lee, D R W Jayne, P A Lyons & K G C Smith

617 **BIOCHEMISTRY** Mitochondrial reticulum for cellular energy distribution in muscle  
B Glancy et al.

621 **MOLECULAR BIOLOGY** Molecular basis for 5-carboxycytosine recognition by RNA polymerase II elongation complex  
L Wang et al.

626 **RETRACTION** Integrative genomics identifies APOE ε4 effectors in Alzheimer's disease  
H Rhinn et al.

626 **CORRIGENDUM** Divergent reprogramming routes lead to alternative stem-cell states  
P D Tonge et al.

626 **CORRIGENDUM** Genome-wide characterization of the routes to pluripotency  
S M I Hussein et al.