

CONTENTS

7 July 2016 / Vol 535 / Issue No 7610

THIS WEEK

EDITORIALS

7 POSTGRADUATE RESEARCH

Doctor, doctor

PhDs can be a defining moment — but is there a better way to pursue them?

7 MEDICAL RESEARCH

False assumptions

Faster approvals for stem-cell therapies must not compromise safety

8 HEALTH

Beyond Zika

It is a scandal that more is not being done to address birth defects

WORLD VIEW

9 Find the time to discuss new bioweapons

Malcolm Dando

Emerging scientific dangers must be taken seriously

RESEARCH HIGHLIGHTS

10 SELECTIONS FROM THE SCIENTIFIC LITERATURE

Frigates in flight / Neutrino scarcity / Lizard camouflage / Making Martian moons / Anti-piracy play unpopular / Robots on a roll / Hidden cancer stem cells

SEVEN DAYS

12 THE NEWS IN BRIEF

Juno reaches Jupiter / Ozone hole starts to heal / Eco-extremists kill Mexican chemist / Nobel laureates call on Greenpeace to end GM opposition

CAREERS

189 COLUMN

Keep it moving

Søren-Peter Olesen

A postdoc post does not have to be a commitment to an academic career

190 UNIVERSITY JOBS

Germany to fund tenure-track posts

Government action is proposed to tackle a shortage of tenured posts

NATUREJOBS ADVERTISING FEATURE

Spotlight on Yamanishi Prefecture

NEWS IN FOCUS

15 POLITICS

US science adviser John Holdren talks budgets, Trump and regrets



17 PUBLIC HEALTH

Zika fears spark drive to combat birth defects caused by cytomegalovirus

18 POLICY

US academies slam plans to change rules for research on humans

18 ECOLOGY

Dry Amazon faces prospect of record fire season

19 SPACE

Tiny CubeSats to boldly go into deep space — if they can hitch a ride

FEATURES

EDUCATION

Back to the thesis

Francis Collins, Sara Seager and Uta Frith revisit their PhDs **PAGE 22**



26 EDUCATION

Future of the thesis

Is it time for PhDs to change?

TOOLBOX

187 GRAPHICS

The visualizations transforming biology

Sophisticated visualizations of your data can do more than just look pretty

COMMENT



29 TECHNOLOGY

Validate personal air-pollution sensors

Alastair Lewis & Peter Edwards

Regulators and researchers must stem the tide of suspect air-quality data

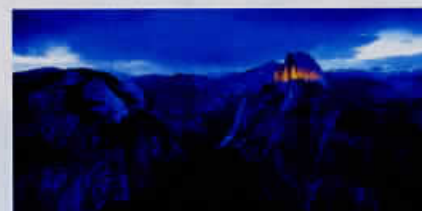
31 PUBLISHING

Make peer review scientific

Drummond Rennie

Thirty years on from the first congress on the topic, refereeing still needs improvement

BOOKS & ARTS



34 CONSERVATION

Geniuses of place

Ethan Carr

CORRESPONDENCE

- 37 Stop songbird nets / Social sciences no soft option / Fetal research witch-hunt / Ensuring food security

FUTURES

192 Life in the clouds

David B Litt



CONTENTS

7 July 2016 / Vol 535 / Issue No 7610

RESEARCH

NEW ONLINE

39 Papers published this week at nature.com

NEWS & VIEWS

40 ASTROPHYSICS

Rare data from a lost satellite

Measurements of gas motion in the Perseus cluster

Elizabeth Blanton [SEE LETTER P.117](#)

41 NEUROSCIENCE

In search of the memory molecule

Fresh evidence that PKM- ζ maintains memories in mice

Paul W Frankland & Sheena A Josselyn

42 CHEMICAL PHYSICS

Quantum control of light-induced reactions

How molecules at ultralow energies are broken apart by light

David W Chandler [SEE LETTER P.122](#)

44 CONSERVATION

The rainforest's 'do not disturb' signs

Measuring rainforest biodiversity losses due to human disturbances

David P Edwards [SEE LETTER P.144](#)

45 COMPUTATIONAL NEUROSCIENCE

Species-specific motion detectors

Directional selectivity is more finely tuned in mice than rabbits

Thomas Euler & Tom Baden

[SEE ARTICLE P.105](#)

ARTICLES

105 COMPUTATIONAL NEUROSCIENCE Species-specific wiring for direction selectivity in the mammalian retina

H Ding, R G Smith, A Poleg-Polsky, J S Diamond & K L Briggman

[SEE N&V P.45](#)

111 IMMUNOLOGY Pore-forming activity and structural autoinhibition of the gasdermin family

J Ding et al.

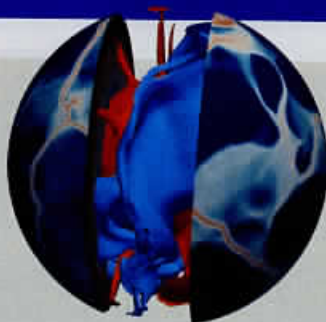
LETTERS

117 ASTROPHYSICS The quiescent intracluster medium in the core of the Perseus cluster

The Hitomi collaboration [SEE N&V P.40](#)

122 CHEMICAL PHYSICS Photodissociation of ultracold diatomic strontium molecules with quantum state control

M McDonald et al. [SEE N&V P.42](#)



ON THE COVER

Shifting plates

Viscosity field and surface of a convection model of the Earth. Low viscosity zones (red) are plate boundaries and high viscosity zones (blue) are continents. The interior shows hotspots (red) and subduction zones. Models of mantle convection with plate-like behaviour are used to demonstrate that the size-frequency distribution of tectonic plates is controlled by subduction geometry — the spacing between subducting slabs controls the layout of large plates, and stress caused by the bending of trenches breaks plates into smaller fragments. [PAGE 140](#)

127 QUANTUM OPTICS Single-molecule strong coupling at room temperature in plasmonic nanocavities

R Chikkaraddy et al.

131 MATERIALS CHEMISTRY Lanthanum-catalysed synthesis of microporous 3D graphene-like carbons in a zeolite template

K Kim et al.

136 BIOMATERIALS Design of a hyperstable 60-subunit protein icosahedron

Y Hsia et al.

140 TECTONICS Subduction controls the distribution and fragmentation of Earth's tectonic plates

C Mallard, N Coltice, M Seton, R D Müller & P J Tackley

144 FOREST ECOLOGY Anthropogenic disturbance in tropical forests can double biodiversity loss from deforestation

J Barlow et al. [SEE N&V P.44](#)

148 CANCER THERAPY Allosteric inhibition of SHP2 phosphatase inhibits cancers driven by receptor tyrosine kinases

Y-N P Chen et al.

153 IMMUNOLOGY Inflammasome-activated gasdermin D causes pyroptosis by forming membrane pores

X Liu et al.

159 VIROLOGY Genetic dissection of Flaviviridae host factors through genome-scale CRISPR screens

C D Marceau et al.

164 VIROLOGY A CRISPR screen defines a signal peptide processing pathway required by flaviviruses

R Zhang et al.

169 VIROLOGY Toremifene interacts with and destabilizes the Ebola virus glycoprotein

Y Zhao et al.

173 VIROLOGY A core viral protein binds host nucleosomes to sequester immune danger signals

D C Avgousti et al.

178 MOLECULAR BIOLOGY The nature of mutations induced by replication-transcription collisions

T S Sankar, B D Wastuwidyaningtyas, Y Dong, S A Lewis & J D Wang

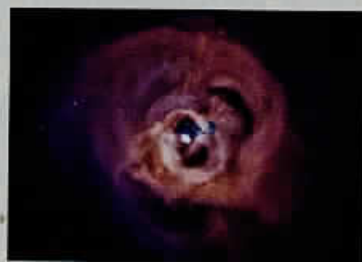
182 BIOCHEMISTRY Allosteric coupling from G protein to the agonist-binding pocket in GPCRs

B T DeVree et al.

ASTROPHYSICS

Galaxy quest

X-ray observations of the oddly quiet galaxy cluster in Perseus. [PAGE 117](#)



C. MALLARD ET AL.

X-RAY: NASA/CXC/SAO/EBL/BLU ET AL.