

TM
N28/e

INSIGHT
Sustainable ecosystems
and society

nature

THE INTERNATIONAL WEEKLY JOURNAL OF SCIENCE

FULL SPEED AHEAD

*Plasma wakefield
machines — the particle
accelerators of the
future?* **PAGES 40 & 92**

CENTRAL EUROPE

LIFE AFTER THE WALL

*Science 25 years after the
collapse of communism*

PAGE 22

ENVIRONMENTAL SCIENCE

CASH, CONFLICT, CONSERVATION

*To protect the planet, stop the
infighting and fudging*

PAGES 27, 28 & 32

INTERACTIVE NOTEBOOKS

SHARE AND SHARE ALIKE

*IPython allows
on-the-run analysis*

PAGE 151

NATURE.COM/NATURE

6 November 2014 £10

Vol. 515, No. 7525



9 770028 083095

45

CONTENTS

6 November 2014 / Vol 515 / Issue No 7525

THIS WEEK

EDITORIALS

7 RESEARCH

Journals unite for reproducibility

Consensus on reporting principles aims to improve biomedical research

7 EUROPE

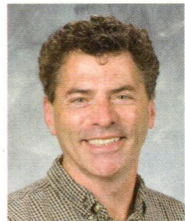
On the mend

The regeneration of central Europe would benefit from a helping hand

8 CONSERVATION

Protect the parks

The needs of development and conservation require balance



WORLD VIEW

9 Metascience could rescue the 'replication crisis'

Jonathan W Schooler
Independent checks before publication offer a way forward

RESEARCH HIGHLIGHTS

10 SELECTIONS FROM THE SCIENTIFIC LITERATURE

A better model for Ebola / Bone renewal / Fish with grunt / Chimps hone the menu / Women lose out at conferences / The glow of nostalgia



SEVEN DAYS

12 THE NEWS IN BRIEF

Poland joins European Southern Observatory / IPCC issues stark climate warning / Lava flow threatens Hawaiian town / China's Moon mission a success

CAREERS

153 COLUMN

It takes time and a team to win grants

An early start — and an early finish — will help an application succeed, says grant specialist Ingrid Eisenstadter

NATUREJOBS ADVERTISING FEATURE

Spotlight on francophone regions

NEWS IN FOCUS



15 SPACEFLIGHT

Commercial space firms resolute after fatal crash of rocket plane

16 CONSERVATION

Global parks conference puts spotlight on Great Barrier Reef

17 FUNDING

German government reaffirms financial commitment to science

18 EPIDEMIOLOGY

Mathematical models under fire in Ebola outbreak

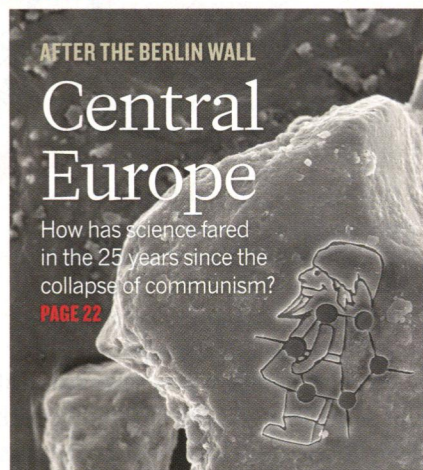
19 POLITICS

NIH spending on rare diseases is shaped by lobbying efforts

20 SCIENCE AND RELIGION

Microscopist claims religious intolerance in job dismissal

FEATURES



AFTER THE BERLIN WALL

Central Europe

How has science fared in the 25 years since the collapse of communism?

PAGE 22

TOOLBOX

151 INTERACTIVE NOTEBOOKS

Sharing the code

IPython notebook makes it easier to share and reproduce data analyses

COMMENT

27 CONSERVATION

A call for inclusive conservation

Heather Tallis & Jane Lubchenco
Infighting must end if we are to protect the planet

CONSERVATION

A to-do list for parks

Seven experts explore how to make protected areas more effective at preserving biodiversity [PAGE 28](#)



32 ECONOMICS

Account for depreciation of natural capital

Edward B Barbier
Damage to ecosystems must be included in economic analyses

BOOKS & ARTS

34 HISTORY OF SCIENCE

Chemists behaving badly

Theodore Gray

35 BOOKS IN BRIEF

36 CHEMISTRY

A life in science and literature

Alison Abbott

CORRESPONDENCE

37 Damming evidence / Forgotten Soviet pioneer / Helping the lost / Sharing biodiversity benefits

FUTURES

156 Boundary waters

Marissa Linggen

CONTENTS

6 November 2014 / Vol 515 / Issue No 7525

RESEARCH

NEW ONLINE

39 Papers published this week at nature.com

NEWS & VIEWS

40 ACCELERATOR PHYSICS

Surf's up at SLAC

Efficient electron acceleration in a 30-centimetre-long plasma chamber
Mike Downer & Rafal Zgadzaj

SEE LETTER P.92

41 DEVELOPMENTAL BIOLOGY

Cells unite by trapping a signal

Cell coordination by trapped extracellular fibroblastic growth factors
James Sharpe SEE LETTER P.120

42 ASTROPHYSICS

Monster star found hiding in plain sight

Identification of a massive star in a young star cluster
Donald F Figer

44 ECOLOGY

Diversity breeds complementarity

Ecosystem-level consequences of character displacement in plants
David Tilman & Emilie Snell-Rood
SEE LETTER P.108

45 ORGANIC CHEMISTRY

Shape control in reactions with light

Stereoselective, photocatalytic α -alkylation of carbonyl compounds
Kazimer L Skubi & Tehshik P Yoon
SEE LETTER P.100

46 CANCER

Metastasis risk after anti-macrophage therapy

Monocyte rebound to tumours after cessation of anti-CCL2 treatment
Ioanna Keklikoglou & Michele De Palma
SEE LETTER P.130

ARTICLES

75 EVOLUTIONARY BIOLOGY Life cycles, fitness decoupling and the evolution of multicellularity

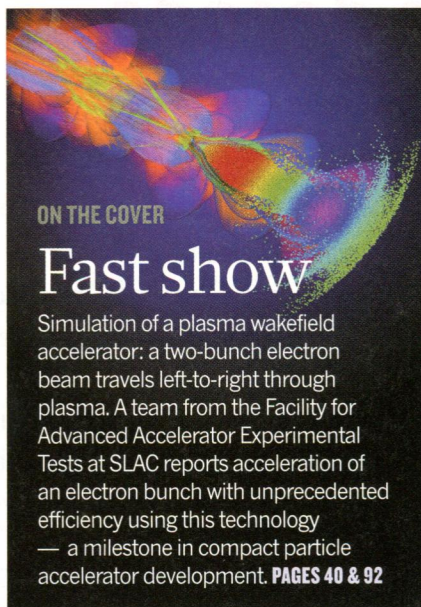
K Hammerschmidt, C J Rose, B Kerr & P B Rainey

80 STRUCTURAL BIOLOGY Architecture of mammalian respiratory complex I

K R Vinothkumar, J Zhu & J Hirst

LETTERS

85 ASTROPHYSICS Turbulent heating in



ON THE COVER

Fast show

Simulation of a plasma wakefield accelerator: a two-bunch electron beam travels left-to-right through plasma. A team from the Facility for Advanced Accelerator Experimental Tests at SLAC reports acceleration of an electron bunch with unprecedented efficiency using this technology — a milestone in compact particle accelerator development. **PAGES 40 & 92**

galaxy clusters brightest in X-rays
I Zhuravleva et al.

88 ASTROPHYSICS Suppression of cooling by strong magnetic fields in white dwarf stars

G Valyavin et al.

92 ACCELERATOR PHYSICS High-efficiency acceleration of an electron beam in a plasma wakefield accelerator

M Litos et al. SEE N&V P.40

96 OPTRONICS AND PHOTONICS Solution-processed, high-performance light-emitting diodes based on quantum dots

X Dai et al.

100 ORGANIC CHEMISTRY Asymmetric photoredox transition-metal catalysis activated by visible light

H Huo et al. SEE N&V P.45

104 CLIMATE SCIENCE Recent Northern Hemisphere stratospheric HCl increase due to atmospheric circulation changes

E Mahieu et al.

108 ECOLOGY Selection for niche differentiation in plant communities increases biodiversity effects

D Zuppinger-Dingley et al. SEE N&V P.44

112 DEVELOPMENTAL BIOLOGY Nodal signalling determines biradial

asymmetry in *Hydra*

H Watanabe et al.

116 NEUROSCIENCE Sensory-evoked LTP driven by dendritic plateau potentials *in vivo*

F Gambino et al.

120 DEVELOPMENTAL BIOLOGY Luminal signalling links cell communication to tissue architecture during organogenesis

S Durdu et al. SEE N&V P.41

125 PLANT SCIENCE PLETHORA gradient formation mechanism separates auxin responses

A P Mähönen et al.

130 CANCER Cessation of CCL2 inhibition accelerates breast cancer metastasis by promoting angiogenesis

L Bonapace et al. SEE N&V P.46

134 CANCER Tumour-infiltrating Gr-1⁺ myeloid cells antagonize senescence in cancer

D Di Mitri et al.

138 IMMUNOLOGY Broad and potent HIV-1 neutralization by a human antibody that binds the gp41-gp120 interface

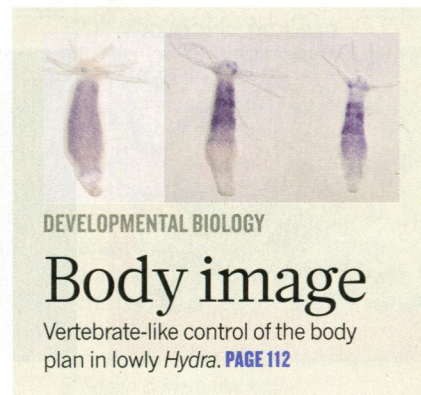
J Huang et al.

143 CELL BIOLOGY Pseudouridine profiling reveals regulated mRNA pseudouridylation in yeast and human cells

T M Carlile et al.

147 STRUCTURAL BIOLOGY Crystal structure of the RNA-guided immune surveillance Cascade complex in *Escherichia coli*

H Zhao et al.



DEVELOPMENTAL BIOLOGY

Body image

Vertebrate-like control of the body plan in lowly *Hydra*. **PAGE 112**