

CONTENTS

23 July 2015 / Vol 523 / Issue No 7561

THIS WEEK

EDITORIALS

381 AGRICULTURE

Prepare farms for the future

Crops must be readied to cope with climate change

381 CAREERS

Timeless advice

There is more to a successful science career than being good at science

382 REPLICABILITY

It's good to talk

Better communication will help to alleviate the replication crisis

WORLD VIEW

383 Russia's crackdowns are jeopardizing its science

Fyodor Kondrashov
Impinging on democratic freedoms is not the way to nurture research



RESEARCH HIGHLIGHTS

384 SELECTIONS FROM THE SCIENTIFIC LITERATURE

Chicken on the menu / Solar-fossil fuel / An eclipsing binary / How to replicate experiments / A hand in evolution / Oldest sperm / Genetic factors in autism

SEVEN DAYS

386 THE NEWS IN BRIEF

SpaceX releases details of crash fault / University of Minnesota faces ethics scandal / Heads roll at the APA / Cherenkov telescope gets two homes

CAREERS

491 CAREER ADVANCEMENT

Insider knowledge

Experienced colleagues can give young researchers valuable advice — just ask

493 TURNING POINT

Polar-bear survival is in the hands of law-makers and politicians, guided by the likes of ecologist Mike Runge

NEWS IN FOCUS



389 PLANETARY SCIENCE

Fly-by reveals vibrant view of Pluto

391 CLINICAL TRIALS

Massive precision-medicine study seeks ethnic diversity

392 ASTRONOMY

Cash windfall to boost hunt for extraterrestrial intelligence

393 IMMUNOLOGY

Teenager born with HIV shatters record for post-treatment remission

394 NUCLEAR NEGOTIATIONS

Sanctions lift would ease science in Iran

394 SPACE SCIENCE

Britain embraces human-spaceflight research

FEATURES



ADAPTATION RESEARCH

Climate-proof farms

Scientists work with farmers to brace agriculture for climate change **PAGE 396**

398 MOLECULAR BIOLOGY

The elaborate architecture of RNA

Structures reveal twists and turns of RNA molecules

COMMENT

401 BIODIVERSITY

Stop misuse of biodiversity offsets

Martine Maron et al.

Compensation funds must be used with care if they are to aid conservation efforts



CONSERVATION

Track from space

Agree on metrics to monitor biodiversity using satellites, say Andrew K Skidmore and colleagues. **PAGE 403**

BOOKS & ARTS

406 MATHEMATICS

The mercurial mathematician

Michael Harris

407 SCIENCE FICTION

Star-flight dreaming

Gregory Benford

408 EXPERIMENTAL PSYCHOLOGY

The anatomy of obedience

Brendan Maher

CORRESPONDENCE

410 Animals wasted in toxicology / Free trade can promote wildlife poaching / Krill and climate / Climate laws



FUTURES

496 The memory of trees

Lynette Mejía

CONTENTS

23 July 2015 / Vol 523 / Issue No 7561

RESEARCH

NEW ONLINE

- 411 Papers published this week at
nature.com

NEWS & VIEWS

412 NANOTECHNOLOGY

Pathfinder for DNA constructs

Virtual polygon meshes as templates
for 3D nanoscale DNA objects

Tim Liedl

SEE LETTER P.441

413 PARASITOLOGY

CRISPR for *Cryptosporidium*

Genetic modification and propagation
methods for *Cryptosporidium*

Stephen M Beverley

SEE LETTER P.477

414 GENETICS

Feedforward loop for diversity

Elevated mutation rates in genomes
with high levels of heterozygosity

Michael Lynch

SEE LETTER P.463

416 COMPUTATIONAL IMAGING

Machine learning for 3D microscopy

Artificial neural networks improve
microscopic imaging of cells

Laura Waller & Lei Tian

417 ORGANIC CHEMISTRY

Natural polarity inverted

A catalytic enantioselective
umpolung reaction of imines

Fedor Romanov-Michailidis
& Tomislav Rovis

SEE LETTER P.445

ARTICLES

419 COMPUTATIONAL NEUROSCIENCE

Speed cells in the medial entorhinal cortex

E Kropff, J E Carmichael, M-B Moser
& E I Moser

425 STRUCTURAL BIOLOGY Crystal structures

of a polypeptide processing and secretion transporter

D Y-w Lin, S Huang & J Chen

431 DISEASES OF THE NERVOUS SYSTEM

Antibody against early driver of neurodegeneration *cis* P-tau blocks brain injury and tauopathy

A Kondo et al.



ON THE COVER

Green light for transplantation

Adult zebrafish engineered to act as a competitive marrow transplantation system. Haematopoietic stem and progenitor cell (HSPC) transplants — with bone marrow or peripheral blood progenitor cells — are used to treat cancers and diseases of the blood and immune system, but little is known about how HSPCs engraft to the host. In a new zebrafish model engraftment is measured by *in vivo* fluorescence imaging of the kidney — the adult haematopoietic site. **PAGE 460**

LETTERS

437 SOLAR PHYSICS Small-scale filament eruptions as the driver of X-ray jets in solar coronal holes

A C Sterling, R L Moore, D A Falconer
& M Adams

441 DNA NANOTECHNOLOGY DNA rendering of polyhedral meshes at the nanoscale

E Benson et al. **SEE N&V P.412**

445 ORGANIC CHEMISTRY Catalytic asymmetric umpolung reactions of imines

Y Wu, L Hu, Z Li & L Deng **SEE N&V P.417**

451 ENVIRONMENTAL CHEMISTRY Statistical analysis of iron geochemical data suggests limited late Proterozoic oxygenation

E A Sperling et al.

455 POPULATION GENETICS The ancestry and affiliations of Kennewick Man

M Rasmussen et al.

459 POPULATION GENETICS Directional dominance on stature and cognition in diverse human populations

P K Joshi et al.

463 GENETICS Parent-progeny sequencing indicates higher mutation rates in heterozygotes

S Yang et al. **SEE N&V P.414**

468 STEM CELLS Epoxyeicosatrienoic acids enhance embryonic haematopoiesis and adult marrow engraftment

P Li et al.

472 PLANT SCIENCES Redox rhythm reinforces the circadian clock to gate immune response

M Zhou et al.

477 PARASITOLOGY Genetic modification of the diarrhoeal pathogen *Cryptosporidium parvum*

S Vinayak et al. **SEE N&V P.413**

481 BIOTECHNOLOGY Engineered CRISPR-Cas9 nucleases with altered PAM specificities

B P Kleinstiver et al.

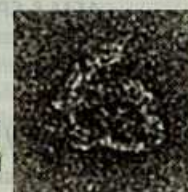
486 EPIGENOMICS Single-cell chromatin accessibility reveals principles of regulatory variation

J D Buenrostro et al.

DNA NANOTECHNOLOGY

Fit to print

A new method for folding complex DNA structures is a step towards three-dimensional printing at the nanoscale. **PAGE 441**



VEERA BINDER & ELLEN VAN ROOIJEN