

CONTENTS

19 November 2015 / Vol 527 / Issue No 7578

THIS WEEK

EDITORIALS

275 FUNDING

Research for all

Agencies must work to stamp out both negative and positive bias

275 GENETIC MODIFICATION

Defensive drives

Open communication will help in developing adequate safeguards

276 SPORT

Dope rules

Science will support antidoping efforts best if joined by good governance

WORLD VIEW

277 Time to cry out for academic freedom

Colin Macilwain

The push to make institutions more businesslike should not sacrifice democracy

RESEARCH HIGHLIGHTS



278 SELECTIONS FROM THE SCIENTIFIC LITERATURE

Seeing polarized light / Save a species / Gene drive tamed / Strength assessment / Adult cells reprogrammed / Oil-eating microbes / Skinny superconductors

SEVEN DAYS

280 THE NEWS IN BRIEF

Safe space-junk landing / Paris climate talks to proceed / Pesticide risk downgraded

CAREERS

399 LAB TRANSITIONS

The bumpy road to relocation

Scientists should start making plans as soon as a move looks likely

401 TURNING POINT

Media training is a must, says engineer Daniel Carder, whose diesel-emissions work hit the headlines unexpectedly

NEWS IN FOCUS



283 BIOCHEMISTRY

Protein 'biocompass' offers clues to magnetic sensing

284 COSMOLOGY

European Pathfinder mission to test gravitational-wave detection gear in space

286 PHYSICS

Wayward satellites to check how gravity affects passage of time

286 EQUALITY

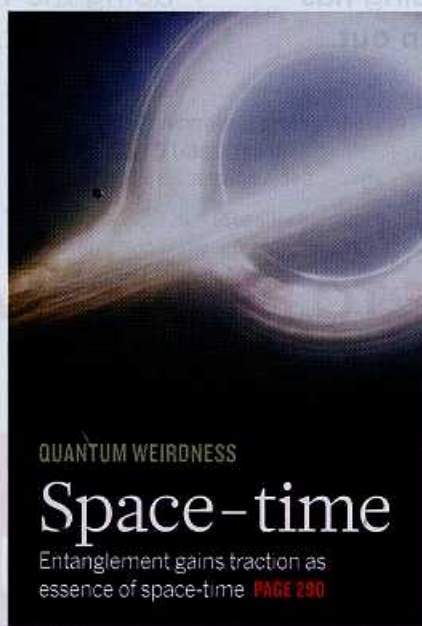
NIH still favours white grant applicants over those from minority groups

288 SPACE

A graphical guide to exoplanet discovery



FEATURES



QUANTUM WEIRDNESS

Space-time

Entanglement gains traction as essence of space-time **PAGE 290**

COMMENT

RESOURCES

China's water needs

Don't divert, fix the management, write Jon Barnett and colleagues **PAGE 295**



298 HISTORY

Einstein was no lone genius

Michel Janssen & Jürgen Renn

General theory of relativity was something of a collaborative effort

BOOKS & ARTS

302 MATHEMATICS

Logic and Lewis Carroll

Francine Abeles

303 BOOKS IN BRIEF

CORRESPONDENCE

305 Emissions from peat fires / Renewables in Russia / Cannabis policy



OBITUARY

306 Richard Heck (1931–2015)

Victor Snieckus



FUTURES

404 Age progression

Susana Martinez-Conde

CONTENTS

19 November 2015 / Vol 527 / Issue No 7578

RESEARCH

NEW ONLINE

307 Papers published this week at nature.com

NEWS & VIEWS

308 IMAGING TECHNIQUES

Extra dimension for bone analysis

Methods for the multi-scale, 3D analysis of bone and tooth tissue

Peter Fratzl **SEE LETTERS P.345 & P.353**

309 ANTIBIOTICS

Homed to the hideout

An antibody-antibiotic conjugate targets intracellular bacteria

Wolf-Dietrich Hardt **SEE ARTICLE P.323**

310 ASTROPHYSICS

Growing planet brought to light

Observations of a young exoplanet growing in its birthplace

Zhaohuan Zhu **SEE LETTER P.342**

311 EVOLUTION

On the crest of becoming vertebrate

Ascidian neurons that share features with neural-crest-derived neurons

Marianne E Bronner **SEE LETTER P.371**

312 CANCER

Organ-seeking vesicles

Exosomes from cancer cells prepare specific organs for metastases

Janusz Rak **SEE ARTICLE P.329**

314 REHABILITATION

Boost for movement

Timed electric stimulation improves recovery from spinal-cord injury

Randolph J Nudo

315 ECOLOGY

Ecosystem responses to climate extremes

Drought or wet conditions affect the vegetation phenology of ecosystems

Anja Rammig & Miguel D Mahecha

ARTICLES

317 DEVELOPMENT Dpp spreading is

required for medial but not for lateral wing disc growth

S Harmansa, F Hamaratoglu, M Affolter & E Caussinus

323 ANTIBIOTICS Novel antibody-antibiotic

conjugate eliminates intracellular *S. aureus*

S M Lehar et al. **SEE N&V P.309**



ON THE COVER

Down to the bone

Ultrastructure and collagen fibril orientation in a human trabecular bone sample, determined by three-dimensional small-angle X-ray scattering (SAXS). Two papers in this issue combine different tomographic principles with SAXS to visualize hard tissue in bones and teeth.

PAGES 308, 345 & 353

329 **CANCER** Tumour exosome integrins determine organotropic metastasis
A Hoshino et al. **SEE N&V P.312**

336 **STRUCTURAL BIOLOGY** Gating machinery of InsP_3R channels revealed by electron cryomicroscopy
G Fan et al.

LETTERS

342 **ASTRONOMY** Accreting protoplanets in the LkCa 15 transition disk
S Sallum et al. **SEE N&V P.310**

345 **PARTICLE PHYSICS** Measurement of interaction between antiprotons
The STAR Collaboration

349 **IMAGING** Nanostructure surveys of macroscopic specimens by small-angle scattering tensor tomography
M Liebi et al. **SEE N&V P.308**

353 **IMAGING** Six-dimensional real and reciprocal space small-angle X-ray scattering tomography
F Schaff et al. **SEE N&V P.308**

357 **MATERIALS SCIENCE** Methane storage in flexible metal-organic frameworks with intrinsic thermal management

J A Mason et al.

362 **CLIMATE SCIENCES** North Pacific deglacial hypoxic events linked to abrupt ocean warming
S K Praetorius et al.

367 **EVOLUTION** The effects of life history and sexual selection on male and female plumage colouration
J Dale, C J Dey, K Delhey, B Kempenaers & M Valcu

371 **EVOLUTION** Migratory neuronal progenitors arise from the neural plate borders in tunicates
A Stolfi, K Ryan, I A Meinertzhagen & L Christaen **SEE N&V P.311**

375 **DEVELOPMENT** Decapentaplegic and growth control in the developing *Drosophila* wing
T Akiyama & M C Gibson

379 **CANCER** Diversion of aspartate in ASS1-deficient tumours fosters *de novo* pyrimidine synthesis
S Rabinovich et al.

384 **GENETICS** DNA-dependent formation of transcription factor pairs alters their binding specificity
A Jolma et al.

389 **MOLECULAR BIOLOGY** Histone H1 couples initiation and amplification of ubiquitin signalling after DNA damage
T Thorslund et al.

394 **STRUCTURAL BIOLOGY** The inner workings of the hydrazine synthase multiprotein complex
A Dietl et al.

398 **ERRATUM** Arithmetic and local circuitry underlying dopamine prediction errors
N Eshel et al.

398 **ERRATUM** A positional Toll receptor code directs convergent extension in *Drosophila*
A C Paré et al.

398 **CORRIGENDUM** Improving survival by exploiting tumour dependence on stabilized mutant p53 for treatment
E M Alexandrova et al.

398 **CORRIGENDUM** Whole-genome characterization of chemoresistant ovarian cancer
A-M Patch et al.

MARIANNE LIEBI