CONTENTS

11 December 2014 / Vol 516 / Issue No 7530

THIS WEEK

EDITORIALS

143 POLICY

Room for growth

Europe is taking a step forward in regulation of transgenic crops

143 HUMAN RESEARCH

Ethical overkill

Cut back on redundant ethics reviews

144 BIODIVERSITY

Protect and serve

Conservation efforts need to ramp up

WORLD VIEW

145 Assess the real cost of research assessment

Peter M Atkinson

The UK Research Excellence Framework needs tightening up

RESEARCH HIGHLIGHTS

146 SELECTIONS FROM THE SCIENTIFIC LITERATURE

Early ape could handle alcohol / Ice loss a one-way trip / Cockroaches see the night / New metrics on top / Stunning eels / Early bat-nav

SEVEN DAYS

148 THE NEWS IN BRIEF

Orion test flight lifts off / India to join telescope consortium / Einstein documents go open access / EU changes GM-crop stance

CAREERS

277 OCEAN BIOLOGY

Marine dreams

Marine biologists offer reality check to starry-eyed enthusiasts

279 CAREER BRIEFS

NATUREJOBS ADVERTISING FEATURE

Spotlight on marine sciences

NEWS IN FOCUS



EARTHQUAKES

Tsunami warnings for Indian Ocean fall short

153 SPACE

Europe hatches plan to join Russian Moon trips

154 PUBLIC HEALTH

Experts seek to expand Ebola testing in West Africa

Drug firms encouraged by a cancer immunotherapy's success

157 SYSTEMS BIOLOGY

Microsoft billionaire founds US\$100-million 'cell observatory'

FEATURES



Life: a status report

Conservationists struggle to keep tabs on extinction rates PAGE 158

The black box of reprogramming Molecular biologists getting a grip on the route to pluripotency

COMMENT

ECTIOUS DISEASES

'pathogen

on disease, not microbes PAGE 165



BOOKS & ARTS

168 IN RETROSPECT

Elective Affinities Matthew Bell



169 GENETICS

Genius on the fly Ewen Callaway

CORRESPONDENCE

170 Maximize military land use / Europe fails young researchers / Conflict declarations for biodiversity reports / Involve participants in study design / Primates still essential for some research

282 Missed message Rachel Reddick

CONTENTS

11 December 2014 / Vol 516 / Issue No 7530

RESEARCH

NEW ONLINE

171 Papers published this week at nature.com

NEWS & VIEWS

172 STEM CELLS

A designer's guide to pluripotency A newly characterized class of pluripotent stem cell Jun Wu & Juan Carlos Izpisua Belmonte SEE ARTICLES P.192 & P.198

173 MATERIALS SCIENCE

Breakthrough for protons
Protons pass through graphene and
hexagonal boron nitride
Rohit N Karnik SEE LETTER P.227

175 MICROBIOLOGY

A beacon for bacterial tubulin
The protein MapZ positions the division
site in Streptococcus pneumoniae
Elizabeth J Harry SEE LETTER P.259

176 STRUCTURAL BIOLOGY

Calcium-activated proteins visualized Crystal structures of bestrophin and lipid scramblase proteins Matt Whorton SEE ARTICLES P.207 & P.213

178 APPLIED PHYSICS

The virtues of tiling
A nanoscale spider-inspired vibration sensor
Peter Fratzl SEE LETTER P.222

179 HYDROLOGY

When wells run dry
Quantifying freshwater supply and
use around the world
Richard Taylor

REVIEW

181 ORGANIC CHEMISTRY Catalytic enantioselective synthesis of quaternary carbon stereocentres K W Quasdorf & L E Overman

ARTICLES

192 STEM CELLS Divergent reprogramming routes lead to alternative stem-cell states
PD Tonge et al. SEE N&V P.172

198 STEM CELLS Genome-wide characterization of the routes to pluripotency SMI Hussein et al. SEE N&V P.172

NANOSCALE DEVICES

No strings

Cracks are the key to a spider-inspired nanoscale strain detector. PAGE 222



207 STRUCTURAL BIOLOGY X-ray structure of a calcium-activated TMEM16 lipid scramblase

J D Brunner, N K Lim, S Schenck, A Duerst & R Dutzler SEE N&V P.176

213 STRUCTURAL BIOLOGY Structure and insights into the function of a Ca²⁺-activated Cl₂ channel V K Dickson, L Pedi & S B Long SEE N&V P.176

LETTERS

219 PLANETARY SCIENCE H₂D⁺ observations give an age of at least one million years for a cloud core forming Sunlike stars

S Brünken et al.

- 222 NANOSCALE DEVICES Ultrasensitive mechanical crack-based sensor inspired by the spider sensory system D Kang et al. SEE N&V P.178
- 227 MATERIALS SCIENCE Proton transport through one-atom-thick crystals S Hu et al. SEE N&V P.173
- 231 CHEMICAL PHYSICS Formation and properties of ice XVI obtained by emptying a type sII clathrate hydrate A Falenty, T C Hansen & W F Kuhs
- 234 CLIMATE SCIENCES Isotopic constraints on marine and terrestrial N₂O emissions during the last deglaciation A Schilt et al.

- 238 PALAEONTOLOGY Cell differentiation and germ-soma separation in Ediacaran animal embryo-like fossils

 L Chen, S Xiao, K Pang, C Zhou & X Yuan
- 242 MOLECULAR EVOLUTION An evolutionary arms race between KRAB zinc-finger genes ZNF91/93 and SVA/L1 retrotransposons

 FMJ Jacobs et al.
- 246 IMMUNOLOGY Dietary modulation of the microbiome affects autoinflammatory disease J R Lukens et al.
- 250 STRUCTURAL BIOLOGY Structural and mechanistic insights into the bacterial amyloid secretion channel CsgG P Goyal et al.
- 254 IMMUNOLOGY Loss of signalling via Gα13 in germinal centre B-cellderived lymphoma JR Muppidi et al.
- 259 CELL BIOLOGY MapZ marks the division sites and positions FtsZ rings in Streptococcus pneumoniae A Fleurie et al. SEE N&V P.175
- 263 MOLECULAR BIOLOGY Programmable RNA recognition and cleavage by CRISPR/Cas9 M.R.O'Connell et al.
- 267 MOLECULAR BIOLOGY Tyrosine phosphorylation of histone H2A by CK2 regulates transcriptional elongation

 H Basnet et al.
- 272 CELL BIOLOGY Regulation of RNA polymerase II activation by histone acetylation in single living cells T J Stasevich et al.
- 276 CORRIGENDUM Producing primate embryonic stem cells by somatic cell nuclear transfer J A Byrne et al.
- 276 CORRIGENDUM Mitochondrial gene replacement in primate offspring and embryonic stem cells M Tachibana et al.
- 276 CORRIGENDUM Nuclear reprogramming by interphase cytoplasm of two-cell mouse embryos E Kang et al.