# CONTENTS

8 December 2011 / Vol 480 / Issue No 7376

## RESEARCH

#### **NEW ONLINE**

183 Papers published this week at nature.com

#### **NEWS & VIEWS**

184 ORGANIC CHEMISTRY

A radical approach to diversity
Methods for the trifluoromethylation
reaction
Andrew T Parsons & Stephen L Buchwald
SEE LETTER P.224

#### 185 STEM CELLS

#### The clock within

Fine-tuning of stem-cell behaviour by the molecular clock Lorena Aguilar-Arnal & Paolo Sassone-Corsi SEE ARTICLE P.209

## 187 ASTROPHYSICS

## Monster black holes

The most massive black holes known Michele Cappellari SEE LETTER P.215

#### **188 GENETICS**

#### Noise control

How random variation in gene expression affects phenotype Hana El-Samad & Jonathan S Weissman SEE LETTER P.250

# 189 MATERIALS SCIENCE

# A sense for touch

The relationship between friction and surface texture C Mathew Mate & Robert W Carpick

#### 190 CANCER

#### Sacrifice for survival

Cancer cells trade energy for combating oxidative damage Nana-Maria Grüning & Markus Ralser

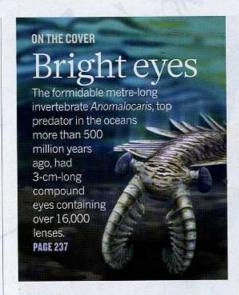
# REVIEW

193 MATERIALS SCIENCE Assembly of hybrid photonic architectures from nanophotonic constituents O Benson

### ARTICLES

- 201 GENETICS New gene functions in megakaryopoiesis and platelet formation C Gieger et al.
- 209 STEM CELLS The circadian molecular clock creates epidermal stem cell heterogeneity

  P Janich et al. SEE N&V P.185



#### LETTERS

- 215 ASTRONOMY Two ten-billion-solar-mass black holes at the centres of giant elliptical galaxies N J McConnell et al. SEE N&V P.187
- 219 PHYSICS Atomic homodyne detection of continuous-variable entangled twin-atom states

  C Gross et al.
- 224 CHEMISTRY Trifluoromethylation of arenes and heteroarenes by means of photoredox catalysis D A Nagib & D W C MacMillan SEE N&V P.184
- 229 EARTH SCIENCE Combined obliquity and precession pacing of late Pleistocene deglaciations P Huybers
- 233 GEOPHYSICS Frictional ageing from interfacial bonding and the origins of rate and state friction Q Li, T E Tullis, D Goldsby & R W Carpick
- 237 PALAEONTOLOGY Acute vision in the giant Cambrian predator Anomalocaris and the origin of compound eyes JR Paterson et al.
- 241 ECOLOGY Ecology drives a global network of gene exchange connecting the human microbiome C S Smillie et al.
- 245 GENETICS Spontaneous epigenetic variation in the Arabidopsis thaliana

methylome

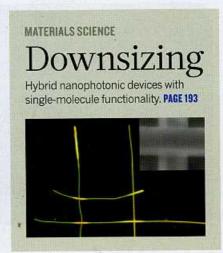
C Becker et al.

- 250 GENETICS Predicting mutation outcome from early stochastic variation in genetic interaction partners A Burga, M O Casanueva & B Lehner SEE N&V P.188
- 254 CELL BIOLOGY Mapping intact protein isoforms in discovery mode using top-down proteomics

  J C Tran et al.
- 259 MOLECULAR BIOLOGY The endonuclease activity of Mili fuels piRNA amplification that silences LINE1 elements

  S De Fazio et al.
- 264 MOLECULAR BIOLOGY Miwi catalysis is required for piRNA amplification-independent LINE1 transposon silencing

  M Reuter et al.
- 268 BIOPHYSICS Atomic-resolution dynamics on the surface of amyloid-β protofibrils probed by solution NMR N L Fawzi, J Ying, R Ghirlando, D A Torchia & G M Clore
- 273 BIOPHYSICS Aspartate 112 is the selectivity filter of the human voltage-gated proton channel B Musset et al.
- 278 CORRIGENDUM A draft genome of Yersinia pestis from victims of the Black Death K I Bos et al.



# CONTENTS

8 December 2011 / Vol 480 / Issue No 7376

# THIS WEEK

# **EDITORIALS**

151 MEDIA

The press under pressure

Scientists must fight back against disingenuous press coverage

151 ENVIRONMENT

**Troubled waters** 

Are marine protected areas the best way to steward the sea?

152 ASTRONOMY

A massive comfort

Black holes offer fresh perspective for life on Earth



**WORLD VIEW** 

153 If you want to win the game, you must join in Rees Kassen Active participation in politics is essential if the scientific voice is to be heard

# RESEARCH HIGHLIGHTS

154 SELECTIONS FROM THE SCIENTIFIC LITERATURE

> Taxol resistance / Bolstering the bloodbrain barrier / More Amazon frogs to find / Pathogen-driven diversity / Ant invader beats a retreat

# **SEVEN DAYS**

156 THE NEWS IN BRIEF

Europe sets out its research budget / Two more elements gain names / Kepler spies 'Goldilocks' planet / ITER shortfall finally made good / Recession fails to quell carbon emissions

# CAREERS

279 GERMANY

Renewables revolution

Proof that investing in green technologies can create jobs

281 COLUMN

Unleash your inner dummy

Peter Fiske

The importance of asking the right questions

281 CAREER BRIEFS

# **NEWS IN FOCUS**



159 GLOBAL HEALTH

Financial squeeze threatens to derail progress on HIV/AIDS

160 NANOTECHNOLOGY

Regulations held up by incomplete toxicity research

161 PHARMACEUTICALS

Novartis rethinks approach to neuroscience

162 EARTH SCIENCE

Spinning sphere of liquid sodium seeks to mimic Earth's dynamo

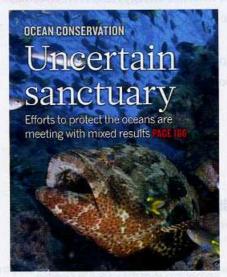
164 EDUCATION

Cutbacks pose threat to quality at University of California

165 OCEANOGRAPHY

China launches state-of-the-art research vessel

#### **FEATURES**



168 HEUROSCIENCE

Master of illusion

Meet Henrik Ehrsson, the man who can give you an out-of-body experience

# COMMENT

171 TECHNOLOGY

Asia's space race

James Clay Moltz

National rivalries could lead to conflict and militarization

174 SOCIAL MEDIA

Open up online research

Alexander Halavais
There's a wealth of new data just

waiting to be mined

## **BOOKS & ARTS**

176 NEUROSCIÉNCE

Scent and sensibility Chris Loss

177 BOOKS IN BRIEF

178 PHILOSOPHY

Meditation in mind Daniel Stoljar

179 081

Chemical connector

Nobelist Roald Hoffmann explains why chemistry is sublime

# CORRESPONDENCE

181 Rational thoughts on violence / Europe needs 'office of research integrity' / Is Iran really going nuclear? / Self deception

## OBITUARY

182 Norman Ramsey (1915–2011)

David Wineland

## **FUTURES**

284 Eating with integrity

David Berreby

ADVERTISEMENT

EPPENDORF AWARD FOR YOUNG EUROPEAN INVESTIGATORS



Presented in partnership with Nature

See announcement on previous page for details of the 2011 award.