

# CONTENTS

7 June 2012 / Vol 486 / Issue No 7401



## EDITORIAL

- 5 **Back to Earth**  
The challenges of the Earth summit

## NEWS

- 13 Brazil's forests face uncertain future

## FEATURES

- 19 **Second chance for the planet**  
20 **Rio report card**  
How the world failed after the first Earth summit

## RIO+20 — SECOND CHANCE FOR THE PLANET

### COMMENT

- 25 **Lead by example**  
*Fabio Scarano, André Guimarães & José Maria da Silva*  
Brazil needs to plot a sustainable course for its development  
27 **The corporate climate overhaul**  
*Pavan Sukhdev*  
Time to change the rules of business

### NEWS & VIEWS

- 36 **Biodiversity: Remote responsibility**  
*Edgar Hertwich*

### REVIEWS

- 52 **Approaching a state shift in Earth's biosphere**  
*A D Barnosky et al.*

- 59 **Biodiversity loss and its impact on humanity**  
*B J Cardinale et al.*

- 68 **Securing natural capital and expanding equity to rescale civilization**  
*P R Ehrlich et al.*

### LETTERS

- 105 **A global synthesis reveals biodiversity loss as a major driver of ecosystem change**  
*D U Hooper et al.*  
109 **International trade drives biodiversity threats in developing nations**  
*M Lenzen et al.*

## THIS WEEK

### WORLD VIEW

- 7 **Turn Spain's budget crisis into an opportunity**  
*Carmen Vela*  
A much-reduced science budget requires a focus on excellence

### RESEARCH HIGHLIGHTS

- 8 **SELECTIONS FROM THE SCIENTIFIC LITERATURE**  
Transplanting pain / Designing self-assembly proteins / Cowbird in the nest / Stress-induced inflammation / Monkey talk / Greenland's ice map



### SEVEN DAYS

- 10 **THE NEWS IN BRIEF**  
Dragon has successful splashdown / Nobel laureate Andrew Huxley dies / Methane overtaking coal as energy source / Venus in transit

## NEWS IN FOCUS

- 14 **SCIENCE AND SOCIETY**  
Creationism on the rise in South Korea  
15 **POLICY**  
Japan plans its energy future  
16 **MEDICINE**  
A new immune therapy for cancer  
17 **GENOMICS**  
Genetic ancestry tests get serious

### TECHNOLOGY

- 141 **BIOBANKS**  
**Building better biobanks**  
A freezer full of data-rich samples is a boon for future research — but just looking after them can be a job in itself

## CAREERS

- 147 **DENTAL SCIENCE**  
**Oral observatory**  
Salivary diagnostics is changing the face of dental research  
149 **TURNING POINT**  
A rejection is just part of the learning process, says chemist Rachel O'Reilly  
149 **CAREER BRIEFS**

## COMMENT

### BOOKS & ARTS

- 30 **FOOD SECURITY**  
**Eating globally**  
*Tom MacMillan*  
31 **VIROLOGY**  
**The battle inside**  
*José Esparza*  
32 **PSYCHOLOGY**  
**Markets in mind**  
*Richard Lea*  
33 **Q&A**  
**The data visualizer**  
Big is beautiful, when it comes to data sets, says digital artist Aaron Koblin



### CORRESPONDENCE

- 34 Data from Millennium Villages / Keep track of threatened species / Don't underestimate seabed archaeology / Travails of Romania's ethics council

### FUTURES

- 152 **After experiment seven**  
*Michael W Lucht*



# CONTENTS

7 June 2012 / Vol 486 / Issue No 7401

## RESEARCH

### NEW ONLINE

35 Papers published this week at nature.com

### NEWS & VIEWS

#### 36 BIODIVERSITY

##### Remote responsibility

International trade directly linked to 30% of species threats  
*Edgar Hertwich* [SEE LETTER P.109](#)

#### 37 CELL BIOLOGY

##### High-tech yeast ageing

Microfluidics facilitates the study of cellular ageing in yeast  
*Michael Polymenis & Brian K Kennedy*

#### 38 ASTROPHYSICS

##### Young dwarfs date an old halo

Measuring the ages of stellar populations in the Milky Way's halo  
*Timothy C Beers* [SEE LETTER P.90](#)

#### 40 GEOCHEMISTRY

##### A dash of deep nebula on the rocks

The abundances of noble-gas isotopes in the deep mantle  
*Chris J Ballentine* [SEE LETTER P.101](#)

#### 41 NEUROSCIENCE

##### Sibling neurons bond to share sensations

Neuronal clones form functional columns in the visual cortex  
*Thomas D Mrsic-Flogel & Tobias Bonhoeffer*  
[SEE LETTERS P.113 & P.118](#)

### REVIEWS

#### 43 TECHNOLOGY Electrocatalyst approaches

and challenges for automotive fuel cells  
*M K Debe*

#### 52 ECOLOGY Approaching a state shift in

Earth's biosphere

*A D Barnosky et al.*

#### 59 ECOLOGY Biodiversity loss and its

impact on humanity

*B J Cardinale et al.*

#### 68 ENVIRONMENTAL BIOLOGY Securing

natural capital and expanding

equity to rescale civilization

*P R Ehrlich, P M Kareiva & G C Daily*

### ARTICLES

#### 74 NEUROSCIENCE Cis-regulatory control

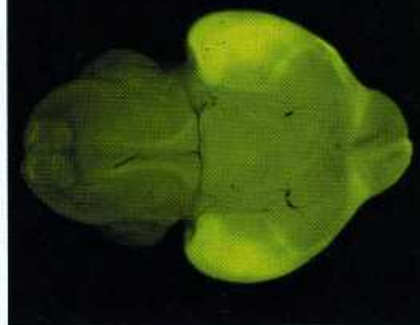
of corticospinal system development and evolution

*S Shim, K Y Kwan, M Li, V Lefebvre & N Sestan*

### NEUROSCIENCE

## Get ahead

Controlling the development of the mammalian neocortex. [PAGE 74](#)



#### 80 CANCER Chemical genetic discovery

of targets and anti-targets for cancer polypharmacology

*A C Dar, T K Das, K M Shokat & R L Cagan*

#### 85 STRUCTURAL BIOLOGY Fluoride ion

encapsulation by  $Mg^{2+}$  ions and phosphates in a fluoride riboswitch

*A Ren, K R Rajashankar & D J Patel*

### LETTERS

#### 90 ASTRONOMY The age of the Milky Way

inner halo

*J S Kalirai* [SEE N&V P.38](#)

#### 93 PLANETARY SCIENCES Ultraviolet-

radiation-induced methane

emissions from meteorites and

the Martian atmosphere

*F Keppler et al.*

#### 97 CLIMATE SCIENCE Late Miocene

decoupling of oceanic warmth and

atmospheric carbon dioxide forcing

*J P LaRiviere et al.*

#### 101 EARTH SCIENCE Early differentiation

and volatile accretion recorded in

deep-mantle neon and xenon

*S Mukhopadhyay* [SEE N&V P.40](#)

#### 105 ECOLOGY A global synthesis reveals

biogeochemistry loss as a major driver of ecosystem change

*D U Hooper et al.*

#### 109 ENVIRONMENTAL SCIENCE International

trade drives biodiversity threats in developing nations

*M Lenzen et al.* [SEE N&V P.36](#)

#### 113 NEUROSCIENCE Preferential electrical

coupling regulates neocortical lineage-dependent microcircuit assembly

*Y-C Yu et al.* [SEE N&V P.41](#)

#### 118 NEUROSCIENCE Clonally related

visual cortical neurons show similar stimulus feature selectivity

*Y Li et al.* [SEE N&V P.41](#)

#### 122 NEUROSCIENCE $\alpha 2\delta$ expression

sets presynaptic calcium channel abundance and release probability

*M B Hoppa, B Lana, W Margas, A C Dolphin & T A Ryan*

#### 126 MOLECULAR BIOLOGY An oxygen-

regulated switch in the protein synthesis machinery

*J Uniacke et al.*

#### 130 STRUCTURAL BIOLOGY Crystal structure

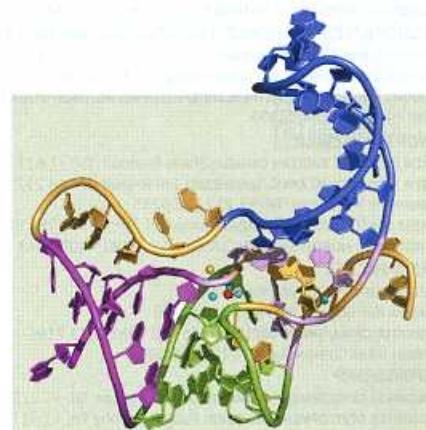
of an orthologue of the NaChBac voltage-gated sodium channel

*X Zhang et al.*

#### 135 STRUCTURAL BIOLOGY Crystal structure

of a voltage-gated sodium channel in two potentially inactivated states

*J Payandeh, T M Gamal El-Din, T Scheuer, N Zheng & W A Catterall*



### STRUCTURAL BIOLOGY

## Switch gear

Two negatives — fluoride and RNA — combine to make a riboswitch. [PAGE 85](#)