# CONTENTS

5 May 2011 / Vol 473 / Issue No 7345

### THIS WEEK

### **EDITORIALS**

5 CLIMATE RESEARCH

### Storm warning

US policy on climate research should not be derailed by political infighting

### 5 MERGING TECHNOLOGIES

### Flagship funding

Europe's new forward-looking research programme is ambitious — but necessary

### **WORLD VIEW**



7 2°C or not 2°C?
That is the climate question
Tim Lenton
Regional targets — not global aspirations — are the way forward

### RESEARCH HIGHLIGHTS

### 8 SELECTIONS FROM THE SCIENTIFIC LITERATURE

Nanotubes pave the way to bigger and brighter screens / Macaques pass memory test / Tracking the route of the 2004 tsunami / Jellyfish keep an eye on the sky



### **SEVEN DAYS**

### 10 THE NEWS IN BRIEF

Environmentalists take a knock in Canadian election / Approvals for hepatitis C drugs / Russian space chief loses job / Distant Universe mapped in 3D / Carbon dioxide footprints quantified

### CAREERS

### 113 SYSTEMS IMMUNOLOGY

### Complexity captured

The tools of systems biology

### 115 TURNING POINT

Plant biologist Martin Jonikas on the chances of improving on nature

115 CAREERS BRIEFS

### NATUREJOBS ADVERTISING FEATURE

Spotlight on immunology

### NEWS IN FOCUS



#### 13 SPACE

Controversial mission to hunt for antimatter prepares for launch on the space shuttle

### 14 SPACE FLIGHT

China unveils 2020 vision for orbiting space station

### 15 STEM CELLS

US researchers heartened by court ruling that overturns injunction on federal stem-cell funds

### 16 MARINE BIOLOGY

A grey whale in the wrong ocean could be a harbinger of climate change

### 17 POLICY

European Science Foundation survey lays ground rules for good practice in peer review

### 19 AGRICULTURAL SCIENCE

Initiative to raise profile of US agricultural research is left in limbo as institute head quits post

### **FEATURES**



SPACE FLIGHT

## Up in the air

Can commercial suborbital space flights produce valid scientific research? PAGE 21

### COMMENT

### 25 ATOMIC PHYSICS

From isotopes to the stars Michael Thoennessen & Bradley Sherrill

### **BOOKS & ARTS**

### ENVIRONMENT

### Water waste

Why do we undervalue such a vital resource, asks Margaret Catley-Carlson PAGE 27



### 28 TECHNOLOGY Together, bit by bit George Rousseau

### 29 BOOKS IN BRIEF

### 30 Q&A

Werner Herzog on the background to his latest movie, The Cave of Forgotten Dreams

### CORRESPONDENCE

31 Divisive US health policy / Making the most of NIH research / Coping with tsunamis / Fukushima developments



### FUTURES 118 Roundabouts Susan Lanigan

GREENBERG WIRGIN GALACTIC

# CONTENTS

5 May 2011 / Vol 473 / Issue No 7345

### **NEW ONLINE**

33 Papers published this week at nature.com

### **NEWS & VIEWS**

- 34 EVOLUTIONARY BIOLOGY
  The origins of novelty
  - Treehopper helmets as a third pair of wings

    Armin P Moczek SEE LETTER P.83
- 35 BIOCHEMISTRY
  Life imitates art
  An enzymatic cycloaddition reaction
  Wendy L Kelly SEE LETTER P.109
- TRANSLATIONAL MEDICINE
  To the rescue of the failing heart
  A small-molecule drug
  enhances myosin activity
  Donald M Bers & Samantha P Harris
- 39 METROLOGY
  Filtering noise with a quantum probe
  Signal extraction via a single electron spin
  John J Bollinger SEE LETTER P.61
- 40 MATERIALS CHEMISTRY
  Catalytic accordions
  Enzyme-like action in a single
  folded polymer chain
  Nicolas Giuseppone & Jean-François Lutz

### ARTICLES

43 GENOMICS Mapping and analysis of chromatin state dynamics in nine human cell types

J Ernst et al.



The elusive structure of photosystem II, key player in photosynthesis. PAGE 55

### RESEARCH



### ON THE COVER

## Body talk

When is a wing not a wing? When it's a 'helmet', like the one on this treehopper, *Hemikyptha marginata* (Fabricius). These insects take liberties with the classical insect body plan.

PAGES 34, 83

- 50 STRUCTURAL BIOLOGY Crystal structure of a phosphorylation-coupled saccharide transporter Y Cao et al.
- 55 STRUCTURAL BIOLOGY Crystal structure of oxygen-evolving photosystem II at a resolution of 1.9 Å Y Umena, K Kawakami, J-R Shen & N Kamiya

### LETTERS

- 61 PHYSICS Single-ion quantum lock-in amplifier S Kotler, N Akerman, Y Glickman, A Keselman & R Ozeri SEE N&V P.39
- 66 APPLIED PHYSICS Convergence of electronic bands for high performance bulk thermoelectrics Y Pei et al.
- 70 EARTH SCIENCE The Soret effect and isotopic fractionation in high-temperature silicate melts G Dominguez, G Wilkins & M H Thiemens
- 74 GEOPHYSICS Depth-dependent extension, two-stage breakup and cratonic underplating at rifted margins R Huismans & C Beaumont
- 79 EVOLUTION Evolved structure of language shows lineage-specific trends in word-order universals

- M Dunn, S J Greenhill, S C Levinson & R D Gray
- plan innovation in treehoppers through the evolution of an extra wing-like appendage B Prud'homme et al. SEE N&V P.34
- 87 NEUROSCIENCE Functional specificity of local synaptic connections in neocortical networks

  H Ko et al.
- 92 NEUROSCIENCE DISC1-dependent switch from progenitor proliferation to migration in the developing cortex K Ishizuka et al.
- 97 EVOLUTION Ancestral polyploidy in seed plants and angiosperms
  Y Jiao et al.
- 101 CANCER Suppression of lung adenocarcinoma progression by Nkx2-1 M M Winslow et al.
- 105 MOLECULAR BIOLOGY CPEB and two poly(A) polymerases control miR-122 stability and p53 mRNA translation D M Būrns, A D'Ambrogio, S Nottrott & J D Richter
- 109 BIOCHEMISTRY Enzyme-catalysed
  [4+2] cycloaddition is a key step in
  the biosynthesis of spinosyn A
  H J Kim, M W Ruszczycky, S-h Choi,
  Y-n Liu & H-w Liu SEE N&V P.35

### EVOLUTION

### Twin track

Analysis of published plant genome sequences reveals two pivotal ancient whole-genome duplications. PAGE 97







