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Angela Merkel must tackle university funding in her third term

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Staying solvent isn't easy if you're a graduate student

## NEWS IN FOCUS



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US marine science faces turbulent budget conditions

#### 470 PUBLISHING

Scooped researcher perplexed by fake paper from phantom authors

#### 471 TECHNOLOGY TRANSFER

Universities wrestle with ethical dilemma over patents

#### 472 BIOLOGY

Mozilla aims to debug biological computer code

#### 473 POLICY

Regulators ponder future control of electronic cigarettes

#### 474 PHYSICS

Iron-based compound sparks fresh interest in superconductors

## FEATURES

#### 476 BIOTECHNOLOGY

##### The start-up engine

Third Rock Ventures is betting big on biotechnology



### MARINE SCIENCE

## Making a splash

The US Ocean Observatories Initiative is about to make its debut **PAGE 480**

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##### Bridging the market gap

Hans Zappe

Closer ties between industry and academia are key for successful innovation

#### 485 ECOLOGY

##### Gene tweaking for conservation

Michael A Thomas

Genetic engineering may be the only hope for some endangered species



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Jan Witkowski

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#### 584 The rumination on what isn't

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## RESEARCH

### NEW ONLINE

493 Papers published this week at nature.com

### NEWS & VIEWS

#### 494 BIODIVERSITY

##### Temperate hotspots

Reef-fish abundance data reveal regions of high functional diversity  
*Derek P Tittensor* [SEE LETTER P.539](#)

#### 495 ELECTRONICS

##### The carbon-nanotube computer has arrived

The most complex electronic device yet built from carbon nanotubes  
*Franz Kreupl* [SEE LETTER P.526](#)

#### 496 EARTH SCIENCE

##### A resolution of the Archaean paradox

A model of early Earth based on volcanic heat pipes  
*Louis Moresi* [SEE ARTICLE P.501](#)

#### 497 CONDENSED-MATTER PHYSICS

##### Rotating molecules as quantum magnets

Controlled dynamics in a system of ultracold heteronuclear molecules  
*Andrew J Daley* [SEE LETTER P.521](#)

#### 498 CELL BIOLOGY

##### A table for two

Parkin is an initiator of both mitophagy and xenophagy  
*Marcel A Behr & Erwin Schurr* [SEE ARTICLE P.512](#)

### ARTICLES

#### 501 GEODYNAMICS Heat-pipe Earth

*W B Moore & A A G Webb* [SEE N&V P.496](#)

#### 506 GENOMICS Transcriptome and genome sequencing uncovers functional variation in humans

*T Lappalainen et al.*

#### 512 IMMUNOLOGY The ubiquitin ligase parkin mediates resistance to intracellular pathogens

*P S Manzanillo et al.* [SEE N&V P.498](#)

### LETTERS

#### 517 ASTRONOMY Swings between rotation and accretion power in a binary millisecond pulsar

*A Papitto et al.*

#### 521 PHYSICS Observation of dipolar spin-exchange interactions with



### ON THE COVER

## Small time

A scanning electron micrograph of a section of a functional computer made with carbon nanotube transistors. This device represents a milestone in the fields of carbon electronics and nanoelectronics. Containing 178 transistors, it uses a simple operating system and can run two different programs concurrently. [PAGES 495 & 526](#)

#### lattice-confined polar molecules

*B Yan et al.* [SEE N&V P.497](#)

#### 526 ELECTRONICS Carbon nanotube computer

*M M Shulaker et al.* [SEE N&V P.495](#)

#### 531 ORGANIC CHEMISTRY Alkane desaturation by concerted double hydrogen atom transfer to benzyne

*D Niu et al.*

#### 535 EARTH SCIENCES Atmospheric oxygenation three billion years ago

*S A Crowe et al.*

#### 539 ECOLOGY Integrating abundance and functional traits reveals new global hotspots of fish diversity

*R D Stuart-Smith et al.* [SEE N&V P.494](#)

#### 543 NEUROSCIENCE A disinhibitory microcircuit initiates critical-period plasticity in the visual cortex

*S J Kuhlman et al.*

#### 547 STRUCTURAL BIOLOGY The BC component of ABC toxins is an RHS-repeat-containing protein encapsulation device

*J N Busby et al.*

#### 551 VIROLOGY Characterization of H7N9 influenza A viruses

#### isolated from humans

*T Watanabe et al.*

#### 556 VIROLOGY Pathogenesis and transmission of avian influenza A (H7N9) virus in ferrets and mice

*J A Belser et al.*

#### 560 VIROLOGY Limited airborne transmission of H7N9 influenza A virus between ferrets

*M Richard et al.*

#### 564 CELL BIOLOGY Wapl is an essential regulator of chromatin structure and chromosome segregation

*A Tedeschi et al.*

#### 569 GENETICS Two replication fork maintenance pathways fuse inverted repeats to rearrange chromosomes

*L Hu et al.*

#### 573 STRUCTURAL BIOLOGY A two-domain elevator mechanism for sodium/proton antiport

*C Lee et al.*

#### 578 CORRIGENDUM Weakened stratospheric quasibiennial oscillation driven by increased tropical mean upwelling

*Y Kawatani & K Hamilton*

#### 578 ERRATUM Anaerobic oxidation of methane coupled to nitrate reduction in a novel archaeal lineage

*M F Haroon et al.*

#### 578 CORRIGENDUM LRG1 promotes angiogenesis by modulating endothelial TGF- $\beta$ signalling

*X Wang et al.*



### GEODYNAMICS

## Piping hot

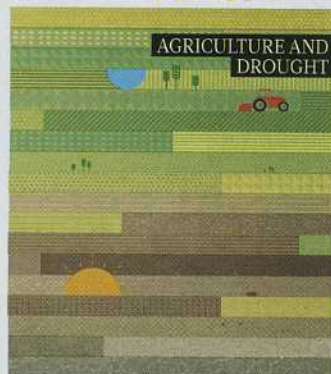
A giant magma ocean on Earth — as it is on Io? [PAGE 501](#)

BUTCH COLYEAR & MAX SHULAKER



## AGRICULTURE AND DROUGHT

### nature**OUTLOOK**



Produced with support from  
USDA  
MORRIS

Adapting to a  
changing climate

Turn to page 492

#### S1 EDITORIAL

**Agriculture and drought**  
Michelle Grayson

#### S2 HYDROLOGY

**The dry facts**  
Are droughts getting worse?

#### S4 WATER

**The flow of technology**  
There are improvements in  
the pipeline

#### S7 PLANT BREEDING

**Discovery in a dry spell**  
Advances in the field of crop  
genetics



Dew collectors are one Israeli technology to mitigate water scarcity.

#### S10 MODELLING

**Predictive yield**  
Better weather forecasts would help  
farmers prepare for drought

#### S12 PERSPECTIVES

**Legislating change**  
Governments should do more to help  
manage the risks of drought

#### S15 CROP PESTS

**Under attack**  
A changing climate increases the  
threat from insects

#### S18 MICROBIOME

**Soil science comes to life**  
Fungi and bacteria provide help  
for stressed plants



  
**MORE  
ONLINE**

#### NATURE.COM

• This *Nature* special issue explores  
climate change, what impacts that  
will have, and how nations can  
mitigate the problem  
[nature.com/ipcc2013](http://nature.com/ipcc2013)

#### COLLECTION

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