

100
N28/e

OUTLOOK
Medical science
masterclass

nature

THE INTERNATIONAL WEEKLY JOURNAL OF SCIENCE



THE UNIVERSITY EXPERIMENT

How to build a campus of the future **PAGE 287**

EPIDEMIOLOGY

EBOLA LESSONS FROM HISTORY

How past outbreaks inform control

PAGE 299

SCIENCE AND POLITICS

PERSONAL CHEMISTRY

When Margaret Thatcher met Dorothy Hodgkin

PAGE 304

ASTROPHYSICS

EARLY STAR FORMATION

Dusty galaxies give us a glimpse of the past

PAGES 310 & 335

NATURE.COM/NATURE

16 October 2014 £10

Vol. 514, No. 7522



CONTENTS

16 October 2014 / Vol 514 / Issue No 7522

THE UNIVERSITY EXPERIMENT


EDITORIAL

- 273 Universities challenged**
The face of higher education is changing at a rapid rate

FEATURES

- 287 The university experiment**
Evolution is the name of the game if the campus is to survive
- 288 Campus as laboratory**
Universities around the world are finding fresh ways to teach and organize research
- 292 The research rethink**
Arizona State University tries to break



 nature.com/universities

down entrenched walls between disciplines

COMMENT

- 295 Chinese university reform in three steps**
Jie Zhang
The way to build a world-class institution is to value and reward the faculty members
- 297 Companies on campus**
Jana J Watson-Capps & Thomas R Cech
There are mutual benefits to be gained from having industry labs in an academic setting

THIS WEEK

EDITORIALS

- 273 PUBLIC ENGAGEMENT**
Dust to dust
Lessons need to be learned from the media circus around gravitational waves
- 274 PUBLISHING**
Review rewards
Welcome recognition for science publishing's unsung heroes

WORLD VIEW

- 275 How terror-proof is your economy?**
Erwann Michel-Kerjan
Make use of scientific skills to analyse the threats posed to finance

RESEARCH HIGHLIGHTS

- 276 SELECTIONS FROM THE SCIENTIFIC LITERATURE**
Colour-coordinated nests / Plant-derived anticlotting agent / Alzheimer's model / SCID gene therapy / Nobel guesswork / Bionic limb control

SEVEN DAYS

- 278 THE NEWS IN BRIEF**
Ebola's economic impact / Ancient Greek treasures / Climate change as security risk / Research vessel sinks / Record high for sea ice

NEWS IN FOCUS

- 281 STEM CELLS**
Reprogrammed cells offer diabetes hope and immunity challenge
- 282 GENOMICS**
Mass merger of genome data creates analytical powerhouse
- 283 MARINE LIFE**
Researchers struggle to arrest decline in African penguins
- 284 INFECTIOUS DISEASE**
Ebola outbreak quantified
- 285 NOBEL PRIZE**
Optics pioneers scoop chemistry prize for revealing inner lives of cells

CAREERS



- 395 MOLECULAR BIOLOGY**
Genetic touch-ups
The development of CRISPR-Cas and similar techniques means that anybody with basic molecular-biology skills can be a gene editor

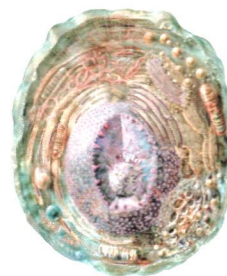
NATUREJOBS ADVERTISING FEATURE
Spotlight on genetics

COMMENT

- 299 INFECTIOUS DISEASE**
Ebola: learn from the past
David L Heymann
Previous outbreaks hold the key to quelling the current crisis in West Africa

BOOKS & ARTS

- 302 ORIGIN OF LIFE**
The first spark
David Deamer
- 303 BOOKS IN BRIEF**
- 304 POLITICS**
When Hodgkin met Thatcher
Jessa Gamble



CORRESPONDENCE

- 305** Pakistan's response to disaster / The Internet's energy consumption / Threats to whales and dolphins / Waugh on badgers / Sanctions hit wildlife



FUTURES
398 The method
Jon Hurwitz

CONTENTS

16 October 2014 / Vol 514 / Issue No 7522

RESEARCH

NEW ONLINE

307 Papers published this week at nature.com

NEWS & VIEWS

308 EVOLUTIONARY BIOLOGY

Survival of the fittest group

Group-level selection drives adaptation in social spiders

Timothy Linksvayer [SEE LETTER P.359](#)

309 CANCER

Staying together on the road to metastasis

Circulating tumour-cell clusters have high metastatic potential

Alessia Bottos & Nancy E Hynes

310 ASTROPHYSICS

How tiny galaxies form stars

Inefficient star formation in two small faint galaxies

Bruce Elmegreen [SEE LETTER P.335](#)

312 CANCER

The origin of human retinoblastoma

A childhood eye cancer arises in differentiating cone-cell precursors

Rod Bremner & Julien Sage

[SEE LETTER P.385](#)

313 SOLID-STATE PHYSICS

A historic experiment redesigned

Detection of Rydberg excitons in a natural crystal of copper oxide

Sven Höfling & Alexey Kavokin

[SEE LETTER P.343](#)

314 GENOMICS

Of monarchs and migration

The DNA sequences of 101 monarch butterflies

Richard H ffrench-Constant

[SEE ARTICLE P.317](#)

ARTICLES

317 **POPULATION GENETICS** The genetics of monarch butterfly migration and warning colouration

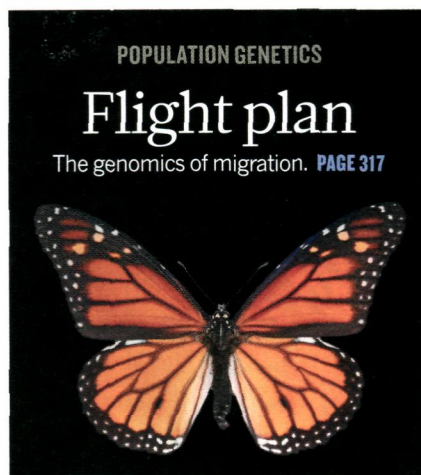
S Zhan et al. [SEE N&V P.314](#)

322 **STEM CELLS** Clonal dynamics of native haematopoiesis

J Sun et al.

328 **NEUROSCIENCE** Structural mechanism of glutamate receptor activation and desensitization

J R Meyerson et al.



LETTERS

335 **ASTROPHYSICS** Inefficient star formation in extremely metal poor galaxies

Y Shi et al. [SEE N&V P.310](#)

339 **ASTROPHYSICS** Binary orbits as the driver of γ -ray emission and mass ejection in classical novae

L Chomiuk et al.

343 **SOLID-STATE PHYSICS** Giant Rydberg excitons in the copper oxide Cu_2O

T Kazimierzczuk, D Fröhlich, S Scheel, H Stolz & M Bayer [SEE N&V P.313](#)

348 **ELECTROCHEMISTRY** Lithium-antimony-lead liquid metal battery for grid-level energy storage

K Wang et al.

351 **ATMOSPHERIC CHEMISTRY** High winter ozone pollution from carbonyl photolysis in an oil and gas basin

P M Edwards et al.

355 **GEOCHEMISTRY** Helium and lead isotopes reveal the geochemical geometry of the Samoan plume

M G Jackson et al.

359 **EVOLUTION** Site-specific group selection drives locally adapted group compositions

J N Pruitt & C J Goodnight

[SEE N&V P.308](#)

363 **EVOLUTION** *Hallucigenia*'s onychophoran-like claws and the case for Tactopoda

M R Smith & J Ortega-Hernández

367 **PLANT SCIENCE** OSCA1 mediates osmotic-stress-evoked Ca^{2+} increases vital for osmosensing in *Arabidopsis*

F Yuan et al.

372 **IMMUNOLOGY** Antiviral immunity via RIG-I-mediated recognition of RNA bearing 5'-diphosphates

D Goubau et al.

376 **CELL BIOLOGY** Stochasticity of metabolism and growth at the single-cell level

D J Kiviet et al.

380 **CANCER** CRISPR-mediated direct mutation of cancer genes in the mouse liver

W Xue et al.

385 **CANCER** Rb suppresses human cone-precursor-derived retinoblastoma tumours

X L Xu et al. [SEE N&V P.312](#)

389 **IMMUNOLOGY** Noncoding RNA transcription targets AID to divergently transcribed loci in B cells

E Pefanis et al.

394 **CORRIGENDUM** Three keys to the radiation of angiosperms into freezing environments

A E Zanne et al.

394 **CORRIGENDUM** A microbial ecosystem beneath the West Antarctic ice sheet

B C Christner et al.

394 **CORRIGENDUM** Connectomic reconstruction of the inner plexiform layer in the mouse retina

M Helmstaedter et al.

