

CONTENTS

8 November 2018 / Vol 563 / Issue No 7730

BOTTOM-UP BIOLOGY

EDITORIAL

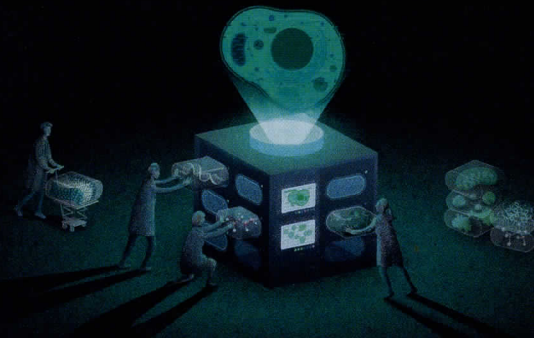
155 **Biology from the bottom up**

FEATURES

171 **Bottom-up biology**
172 **Biology from scratch**

COMMENT

177 **Which biological systems should be engineered?**
Dan Fletcher



go.nature.com/bottomupbiology

NEWS & VIEWS

188 **Living systems engineered**
Matthew Good; Xavier Trepas

192 **Cellular stretch reveals superelastic powers**
Manuel Théry & Atef Asnacios

ARTICLES

203 **Active superelasticity in three-dimensional epithelia of controlled shape**
E Latorre et al.

THIS WEEK

EDITORIALS

155 **GENOMICS**
Launch sequence
Earth BioGenome Project is a welcome conservation effort

156 **CULTURE**
Note worthy
Nominate a female scientist to be pictured on Britain's new banknote

WORLD VIEW

157 **What I learnt pulling a straw out of a turtle's nose**
Christine Figgner
My viral video taught me power and perils of communicating to the public

RESEARCH HIGHLIGHTS

158 **SELECTIONS FROM THE SCIENTIFIC LITERATURE**
Ancient cocoa / Galactic gas cloud / Microbiota migration / Robotic eye treatment / Haiti's forests

SEVEN DAYS

160 **THE NEWS IN BRIEF**



Genome-sequencing plan / Kepler farewell / Gender protest / Indian neutrino lab / African funding

NEWS IN FOCUS

- 163 **LAW**
US Supreme Court gives green light to historic kids' climate lawsuit
- 164 **ECOLOGY**
South Africa's invasive species guzzle precious water
- 165 **ENVIRONMENT**
Australian reef centre to lose almost all government funding
- 166 **ATMOSPHERIC SCIENCE**
Massive project aims to understand severe weather in shadow of Andes
- 167 **GENETICS**
AI hunts for signs of natural selection in the human genome
- 168 **ASTRONOMY**
Hawaii's top court sides with Thirty Meter Telescope
- 168 **ASTROPHYSICS**
Mystery 'Cow' supernova spills its secrets

CAREERS

- 281 **GOVERNMENT**
Perks of agency science
European Commission roles offer attractive prospects
- 283 **COLUMN**
Forge your own path
Look to the future when proposing fellowships

COMMENT

BOOKS & ARTS

180 **PUBLIC HEALTH**
Lessons from the Ebola front lines
Nahid Bhadelia

181 **BOOKS IN BRIEF**

182 **VISION SCIENCE**
An eye on ocular works
Todd Oakley

CORRESPONDENCE

184 Nobel boost for basic research / Mentorship training / China tracks its SDG progress / In defence of the Myers-Briggs / Mekong dams threat

OBITUARY

185 **Leon Lederman (1922–2018)**
Nigel S Lockyer



FUTURES

286 **Remembrance**
Melanie Rees

SUPPLEMENTS

S33 **OUTLINE**

Ulcerative colitis: towards remission
Moving beyond simple relief for debilitating gut inflammation

CONTENTS

8 November 2018 / Vol 563 / Issue No 7730

RESEARCH

NEW ONLINE

187 Papers published this week at nature.com

NEWS & VIEWS

188 FORUM BIOPHYSICS

Living systems engineered

The limits of bottom-up biology debated

Matthew Good; Xavier Trepat

190 GEOLOGY

Proposed early signs of life not set in stone

Whether microbes generated structures in ancient rocks has been questioned

Mark A van Zuilen [SEE LETTER P.241](#)

191 QUANTUM PHYSICS

Quenching our thirst for universality

Universality in quantum systems far from equilibrium

Michael Kolodrubetz

[SEE LETTERS P.217, P.221 & P.225](#)

192 BIOPHYSICS

Cellular stretch reveals superelastic powers

Mammalian cells can undergo large-scale, reversible deformations

Manuel Théry & Atef Asnacios

[SEE ARTICLE P.203](#)

194 MEDICAL RESEARCH

Immune-cell crosstalk in multiple sclerosis

Interactions between B cells and T cells might trigger autoimmunity

Richard M Ransohoff

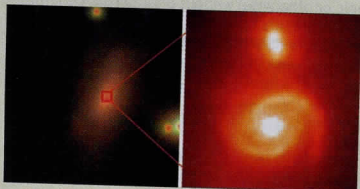
ARTICLES

197 **IMMUNOGENETICS** Gene expression variability across cells and species

ASTRONOMY

Active nuclei

The galaxy mergers fuelling supermassive black holes. [PAGE 214](#)



GEOLOGY

Real life?

New evidence shows that stromalites have a non-biological origin. [PAGE 241](#)



shapes innate immunity

T Hagai et al.

203 **BIOPHYSICS** Active superelasticity in three-dimensional epithelia of controlled shape

E Latorre et al. [SEE N&V P.192](#)

209 **STRUCTURAL BIOLOGY** Tc toxin activation requires unfolding and refolding of a β -propeller

C Gatsogiannis et al.

LETTERS

214 **ASTRONOMY** A population of luminous accreting black holes with hidden mergers

M J Koss et al.

217 **QUANTUM PHYSICS** Observation of universal dynamics in a spinor Bose gas far from equilibrium

M Prüfer et al. [SEE N&V P.191](#)

221 **QUANTUM PHYSICS** Universal prethermal dynamics of Bose gases quenched to unitality

C Eigen et al. [SEE N&V P.191](#)

225 **QUANTUM PHYSICS** Universal dynamics in an isolated one-dimensional Bose gas far from equilibrium

S Erne, R Bücke, T Gasenzer, J Berges & J Schmiedmayer [SEE N&V P.191](#)

230 **NANOSCALE DEVICES** Vowel recognition with four coupled spin-torque nano-oscillators

M Romera et al.

235 **BIOCHEMISTRY** Palladium-mediated enzyme activation suggests multiphase initiation of glycogenesis

M K Bilyard et al.

241 **GEOLOGY** Reassessing evidence of life in 3,700-million-year-old rocks of Greenland

A C Allwood, M T Rosing, D T Flannery, J A Hurowitz & C M Heirweh

[SEE N&V P.190](#)

245 **SOCIAL SCIENCES** Credibility-enhancing displays promote the provision of non-normative public goods

G T Kraft-Todd, B Bollinger, K Gillingham, S Lamp & D G Rand

249 **NEUROSCIENCE** m⁶A facilitates hippocampus-dependent learning and memory through YTHDF1

H Shi et al.

254 **STEM CELLS** Resting zone of the growth plate houses a unique class of skeletal stem cells

K Mizuhashi et al.

259 **PLANT SCIENCES** Transcriptional regulation of nitrogen-associated metabolism and growth

A Gaudinier et al.

265 **CELL SIGNALLING** The SWI/SNF complex is a mechanoregulated inhibitor of YAP and TAZ

L Chang et al.

270 **STRUCTURAL BIOLOGY** Cryo-EM reveals two distinct serotonin-bound conformations of full-length 5-HT_{3A} receptor

S Basak, Y Gicheru, S Rao, M S P Sansom & S Chakrapani

275 **STRUCTURAL BIOLOGY** Conformational transitions of the serotonin 5-HT₃ receptor

L Polovinkin et al.

STRUCTURAL BIOLOGY

Ion channels

Structures of multiple ligand-bound states. [PAGE 270](#)

