

NEWS

IN BRIEF

122 Roundup of the week's news

IN DEPTH

125 SCIENTISTS DREAD GREEK EXIT FROM THE EURO

Decisive 'No' to bailout could lead to a rupture with Europe and endanger key funding *By E. Stokstad*

126 BUMBLEBEES AREN'T KEEPING UP WITH A WARMING PLANET

Pollinators retreat from the south, but don't move north *By C. Carswell*

127 PLAN TO DROP GOALS FOR WOMEN ROILS JAPANESE SCIENCE

Change stirs debate about how to remedy underrepresentation of women *By D. Normile*

128 TARGETING COPPER TO TREAT BREAST CANCER

Business obstacles threaten to delay the phase III trial of a copper-depleting drug *By K. Garber*

129 Cancer's copper connections

By K. Garber

130 PLUTO CAPS ONE MAN'S ODYSSEY

NASA veteran Tom Krimigis has been on missions to all of the sun's planets, and beyond *By E. Hand*

131 U.S. TO REVIEW AGRICULTURAL BIOTECH REGULATIONS

New gene-editing methods challenge old framework *By K. Servick*

FEATURES

132 DEEP SLEEP

Boreholes drilled into Earth's crust get a fresh look for nuclear disposal *By W. Cornwall*

135 Rolling out a welcome mat for waste

By W. Cornwall

INSIGHTS

PERSPECTIVES

136 150 YEARS OF MAXWELL'S EQUATIONS

Powerful tools are available for the manipulation of electromagnetic fields *By N. Engheta*

138 WATER, BOUND AND MOBILE

Isotopic data help to resolve global hydrologic fluxes *By J. R. Brooks*
▶ REPORT P. 175

139 THE MODERN ERA OF HIV-1 VACCINE DEVELOPMENT

Current vaccine designs are on the path to eliciting antibodies that neutralize HIV-1 *By J. R. Mascola*
▶ RESEARCH ARTICLES PP. 154 & 156; REPORT P. 191

141 INTELLECTUALS AND THE RISE OF THE MODERN ECONOMY

Well-educated elites enabled scientific and technological creativity during the Industrial Revolution *By J. Mokyr*

142 COPI GETS A FANCY NEW COAT

An interconnected scaffolding of proteins bends the membrane to form vesicles *By A. J. Noble and S. M. Stagg*
▶ REPORT P. 195

144 MANAGING MINING OF THE DEEP SEABED

Contracts are being granted, but protections are lagging *By L. M. Wedding et al.*

BOOKS ET AL.

146 SPIRALS IN TIME

By H. Scales, reviewed by C. Kemp

147 THE ETHICS POLICE?

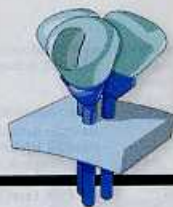
By R. L. Klitzman, reviewed by L. F. Ross

LETTERS

148 MEETING OF THE MINDS: SEND YOUR STORIES

By J. F. Albaugh et al.

Science Staff	118
New Products	200
Science Careers	201



139, 154 & 156

HIV-1's trimeric envelope glycoprotein



187

Structure of a sterol sensor

148 ONLINE BUZZ RECOMMENDING WOMEN

149 REVIEWING EINSTEIN

By *D. Kennefick and M. Blume*

149 TECHNICAL COMMENT ABSTRACTS

RESEARCH

IN BRIEF

150 From *Science* and other journals

REVIEW

153 SEA-LEVEL RISE

Sea-level rise due to polar ice-sheet mass loss during past warm periods
A. Dutton et al.

REVIEW SUMMARY; FOR FULL TEXT:
dx.doi.org/10.1126/science.aaa4019

RESEARCH ARTICLES

154 HIV-1 VACCINES

HIV-1 neutralizing antibodies induced by native-like envelope trimers
R. W. Sanders et al.

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:
dx.doi.org/10.1126/science.aac4223

► PERSPECTIVE P. 139; RESEARCH ARTICLE P. 156; REPORT P. 191

155 IMMUNOLOGY

An interactive reference framework for modeling a dynamic immune system
M. H. Spitzer et al.

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:
dx.doi.org/10.1126/science.1259425



153

156 HIV-1 VACCINES

Priming a broadly neutralizing antibody response to HIV-1 using a germline-targeting immunogen
J. G. Jardine et al.

► PERSPECTIVE P. 139; RESEARCH ARTICLE P. 154; REPORT P. 191

REPORTS

161 SOFT ROBOTICS

A 3D-printed, functionally graded soft robot powered by combustion
N. W. Bartlett et al.

165 APPLIED PHYSICS

Mid-infrared plasmonic biosensing with graphene
D. Rodrigo et al.

168 GALAXY EVOLUTION

An over-massive black hole in a typical star-forming galaxy, 2 billion years after the Big Bang
B. Trakhtenbrot et al.

171 ANIMAL PHYSIOLOGY

Exceptionally low daily energy expenditure in the bamboo-eating giant panda
Y. Nie et al.

175 WATER RESOURCES

Hydrologic connectivity constrains partitioning of global terrestrial water fluxes
S. P. Good et al.

► PERSPECTIVE P. 138

177 CLIMATE CHANGE

Climate change impacts on bumblebees converge across continents
J. T. Kerr et al.

180 PLACE CELLS

Autoassociative dynamics in the generation of sequences of hippocampal place cells
B. E. Pfeiffer and D. J. Foster

184 NEURONAL MODELING

Single-trial spike trains in parietal cortex reveal discrete steps during decision-making
K. W. Latimer et al.

187 PROTEIN STRUCTURE

Crystal structure of a mycobacterial Insig homolog provides insight into how these sensors monitor sterol levels
R. Ren et al.

191 HIV-1 ENVELOPE

Effect of the cytoplasmic domain on antigenic characteristics of HIV-1 envelope glycoprotein
J. Chen et al.

► PERSPECTIVE P. 139; RESEARCH ARTICLES PP. 154 & 156

195 VESICULAR TRANSPORT

A structure of the COPII coat and the role of coat proteins in membrane vesicle assembly
S. O. Dodonova et al.

► PERSPECTIVE P. 142

DEPARTMENTS

121 EDITORIAL

Engaging new scientific horizons
By Marcia McNutt and Alan Stern

206 WORKING LIFE

Getting noticed is half the battle
By Eleftherios P. Diamandis

ON THE COVER



A goal in HIV research is to design a vaccine that will protect against the rapidly mutating virus. Such a vaccine would elicit B cells to produce broadly neutralizing antibodies with

a high affinity for the HIV envelope protein. Pictured here are B cells displaying colored antibodies; B cells in the foreground express unmutated antibodies of varying specificities. Over time, the right mutations take place to create the lineage of the sought-after antibody (lineage depicted by orange-red gradient, with the unmutated ancestor depicted in orange). This happens in some HIV patients naturally, but now scientists have immunized animals with engineered immunogens that prime a first step on the antibody mutation pathway. See pages 139, 154, and 156.

Illustration: *Valerie Altounian/Science*

SCIENCE (ISSN 0036-8075) is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1200 New York Avenue, NW, Washington, DC 20005. Periodicals mail postage (publication No. 484460) paid at Washington, DC, and additional mailing offices. Copyright © 2015 by the American Association for the Advancement of Science. The title SCIENCE is a registered trademark of the AAAS. Domestic individual membership and subscription (51 issues): \$153 (\$74 allocated to subscription); Domestic institutional subscription (51 issues): \$1262; Foreign postage extra: Mexico, Caribbean (surface mail) \$55; other countries (air asset delivery) \$85. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request. GST #R1254 88122. Publications Mail Agreement Number 1069624. Printed in the U.S.A. Change of address: Allow 4 weeks, giving old and new addresses and 8-digit account number. Postmaster: Send change of address to AAAS, P.O. Box 96178, Washington, DC 20090-6178. Single-copy sales: \$10.00 current issue, \$15.00 back issue prepaid includes surface postage; bulk rates on request. Authorization to photocopy material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act is granted by AAAS to libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that \$30.00 per article is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923. The identification code for Science is 0036-8075. Science is indexed in the Reader's Guide to Periodical Literature and in several specialized indexes.