

## EDITORIAL

- 1113 Research Vital to Economic Growth  
*Raymond L. Orbach*

## NEWS OF THE WEEK

- 1118 A roundup of the week's top stories

## NEWS & ANALYSIS

- 1121 Scientists Fear WFIRST Will Be Trailing the Pack
- 1122 Do Island Sites Suggest a Coastal Route to the Americas?  
>> *Report p. 1181*
- 1123 Feathers Are Flying Over Colombian Bird Name Flap
- 1124 Ten Years After Buddhas Destroyed, Afghans Work to Save Monastery
- 1127 Outrage Greet NSF Decision to End STEM Fellows Program

## NEWS FOCUS

- 1128 Breaking the Chain in Bangladesh A Startling Villain  
>> *Science Podcast*
- 1132 Have Physicists Already Glimpsed Particles of Dark Matter?
- 1134 Keeping Europe's Basic Research Agency on Track

## LETTERS

- 1136 Assessing Chemical Risk: Societies Offer Expertise  
*The American Society of Human Genetics et al.*
- A Defense of the Primitive Cheetah Skull  
*J. H. Mazák and P. Christiansen*
- Response  
*D. Tao and Q. Zhanxiang*
- Habitats at Risk: A Step Forward, a Step Back  
*L. Gibson and N. S. Sodhi*

## BOOKS ET AL.

- 1138 Tracking Medicine  
*J. E. Wennberg, reviewed by H. Krumholz*

## POLICY FORUM

- 1139 The Biodiversity and Ecosystem Services Science-Policy Interface  
*C. Perrings et al.*

## PERSPECTIVES

- 1141 Gradient Scaling and Growth  
*L. Le Goff and T. Lecuit*  
>> *Research Article p. 1154*
- 1142 Toward Synthesis of Arbitrary Optical Waveforms  
*D. D. Yavuz*  
>> *Report p. 1165*
- 1143 Molecular Motors, Beauty in Complexity  
*J. A. Spudich*  
>> *Research Article p. 1159*
- 1145 New Epigenetic Drivers of Cancers  
*S. J. Elsässer et al.*  
>> *Report p. 1199*
- 1146 Local Peeling of Graphene  
*D. Gunlycke and P. E. Sheehan*  
>> *Report p. 1168*
- 1147 Establishing the Secretion Hierarchy  
*L. M. Stamm and M. B. Goldberg*  
>> *Reports pp. 1188 and 1192*

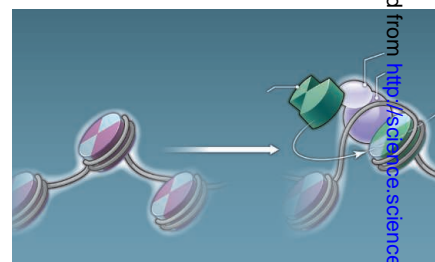
## REVIEW

- 1149 Controlling and Coordinating Development in Vector-Transmitted Parasites  
*K. R. Matthews*

CONTENTS continued >>

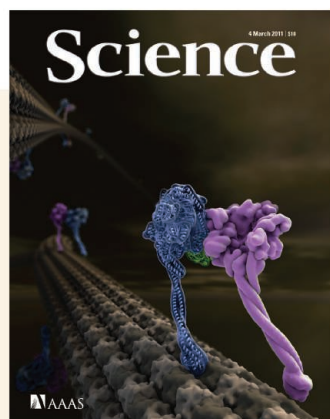


page 1128



pages 1145 & 1199

Downloaded from <http://science.sciencemag.org/> on March 20, 2019



## COVER

Artistic rendering of dynein motor proteins moving along microtubules, based on a crystal structure reported by Carter *et al.* on p. 1159. This study reveals the architecture of the molecular machine that powers the beating of cilia and intracellular transport and provides insight into the mechanism by which energy from adenosine triphosphate hydrolysis is converted into motion.

*Image: Graham Johnson, The Scripps Research Institute and grahamj.com*

## DEPARTMENTS

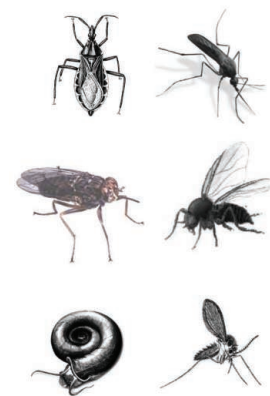
- 1109 This Week in *Science*
- 1114 Editors' Choice
- 1116 *Science* Staff
- 1214 New Products
- 1215 *Science* Careers

## RESEARCH ARTICLES

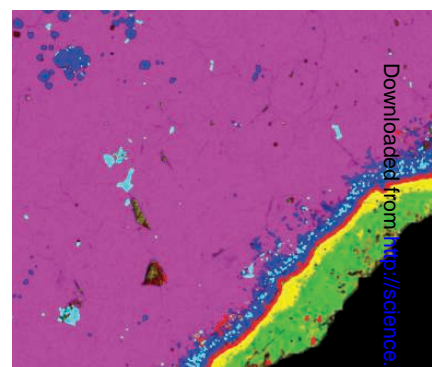
- 1154 **Dynamics of Dpp Signaling and Proliferation Control**  
O. Wartlick et al.  
Mitosis starts when morphogen signaling levels have increased by half since the beginning of the cell cycle.  
>> *Perspective p. 1141*
- 1159 **Crystal Structure of the Dynein Motor Domain**  
A. P. Carter et al.  
The structure reveals the functional elements of the dynein motor and suggests how they change conformation during motility.  
>> *Perspective p. 1143*
- REPORTS**
- 1165 **Synthesis and Measurement of Ultrafast Waveforms from Five Discrete Optical Harmonics**  
H.-S. Chan et al.  
Optical fields have been manipulated like radio frequencies into sawtooth and square-wave patterns.  
>> *Perspective p. 1142*
- 1168 **Layer-by-Layer Removal of Graphene for Device Patterning**  
A. Dimiev et al.  
Reactions of graphene with zinc enable etching of a single graphene layer.  
>> *Perspective p. 1146; Science Podcast*
- 1172 **Helix-Rod Host-Guest Complexes with Shuttling Rates Much Faster than Disassembly**  
Q. Gan et al.  
A molecular helix wrapped around a rigid rod can unwind and move between binding sites.
- 1175 **Oxygen Isotope Variations at the Margin of a CAI Records Circulation Within the Solar Nebula**  
J. I. Simon et al.  
Isotope measurements within an inclusion in a meteorite reveal a record of processes in the early solar system.
- 1178 **Dietary Change and Evolution of Horses in North America**  
M. C. Mhlbachler et al.  
A survey of horse-teeth wear during the past 55 million years implies that evolutionary pressures were generally low.
- 1181 **Paleoindian Seafaring, Maritime Technologies, and Coastal Foraging on California's Channel Islands**  
J. M. Erlandson et al.  
Archaeological sites reveal a variety of tools used to hunt marine birds, mammals, and fish 12,000 years ago.  
>> *News story p. 1122; Science Podcast*

- 1185 ***Pseudomonas sax* Genes Overcome Aliphatic Isothiocyanate-Mediated Non-Host Resistance in *Arabidopsis***  
J. Fan et al.  
Natural-product effectors of disease resistance in *Arabidopsis* reveal complementary disabling mechanisms in the pathogen.
- 1188 **A Sorting Platform Determines the Order of Protein Secretion in Bacterial Type III Systems**  
M. Lara-Tejero et al.  
The bacterial enteropathogen *Salmonella* sorts its effector protein substrates prior to secretion.
- 1192 **Three-Dimensional Model of *Salmonella*'s Needle Complex at Subnanometer Resolution**  
O. Schraidt and T. C. Marlovits  
A cryo-electron microscopy structure of a bacterial secretion complex reveals threefold symmetry.  
>> *Perspective p. 1147*
- 1196 **Structures of SAS-6 Suggest Its Organization in Centrioles**  
M. van Breugel et al.  
Self-assembly of a centriolar protein may contribute to organizing the cartwheel-like hub and establishing centriole symmetry.
- 1199 ***DAXX/ATRX*, *MEN1*, and mTOR Pathway Genes Are Frequently Altered in Pancreatic Neuroendocrine Tumors**  
Y. Jiao et al.  
A rare but deadly form of human pancreatic cancer harbors mutations in chromatin remodeling genes.  
>> *Perspective p. 1145*
- 1203 **Different B Cell Populations Mediate Early and Late Memory During an Endogenous Immune Response**  
K. A. Pape et al.  
A cell enrichment technique reveals the dynamics of the endogenous memory B cell response.
- 1207 **Enhancement of Consolidated Long-Term Memory by Overexpression of Protein Kinase M $\zeta$  in the Neocortex**  
R. Shema et al.  
In rats, overexpression of a persistently active protein kinase C isoform enhances memories long after they have been formed.

CONTENTS continued &gt;&gt;



page 1149



page 1175



pages 1122 &amp; 1181

## SCIENCEONLINE

## SCIENCEEXPRESS

[www.sciencexpress.org](http://www.sciencexpress.org)

### CRYPTOCHROME Is a Blue-Light Sensor That Regulates Neuronal Firing Rate

*K. J. Fogle et al.*

Neurons in the brain that boost the morning response of the circadian rhythm are themselves directly responsive to light.

10.1126/science.1199702

### Selective Inhibition of a Regulatory Subunit of Protein Phosphatase 1 Restores Proteostasis

*P. Tsaytler et al.*

Guanabenz, a small-molecule inhibitor, protects cells from lethal accrual of misfolded proteins in the endoplasmic reticulum.

10.1126/science.1201396

### A Virophage at the Origin of Large DNA Transposons

*M. G. Fischer and C. A. Suttle*

A parasite of a giant DNA virus that rescues the host has been shown to be the progenitor of a widespread transposon.

10.1126/science.1199412

### PAMELA Measurements of Cosmic-Ray Proton and Helium Spectra

*O. Adriani et al.*

Satellite measurements challenge the current understanding of cosmic-ray acceleration and propagation in our galaxy.

10.1126/science.1199172

### Widespread Persistent Thickening of the East Antarctic Ice Sheet by Freezing from the Base

*R. E. Bell et al.*

A large fraction of the ice at Dome A, Antarctica, did not form by the usual process of snowfall compaction.

10.1126/science.1200109

## SCIENCENOW

[www.sciencenow.org](http://www.sciencenow.org)

Highlights From Our Daily News Coverage

### More Evidence Against Dark Matter?

Modified gravity theory alone explains key property of galaxies, one astronomer claims.

<http://scim.ag/dark-matter>

### How the Rocky Mountain Range Got Its Midsection

A new hypothesis could answer a long-standing enigma.

<http://scim.ag/rocky-mountains>

### Does Bird Flu + Swine Flu = Superflu?

Swapping genes between the avian and human influenza viruses could ignite a pandemic.

<http://scim.ag/superflu>

## SCIENCE SIGNALING

[www.sciencesignaling.org](http://www.sciencesignaling.org)

The Signal Transduction Knowledge Environment

**1 March issue:** <http://scim.ag/ss030111>

### RESEARCH ARTICLE: ATP Inhibits the Generation and Function of Regulatory T Cells Through the Activation of Purinergic P2X Receptors

*U. Schenk et al.*

Purinergic signaling during inflammation converts immunosuppressive CD4<sup>+</sup> T cells into proinflammatory ones.

### PERSPECTIVE: Astrocytes Shape Axonal Signaling

*D. Debanne and S. Rama*

Action potential waveform can be altered by astrocyte-mediated activation of neuronal glutamate receptors.

## GLOSSARY

Find out what APA, Cav-1, and SRK mean in the world of cell signaling.

### NETWATCH: The Clickable Guard Cell

Interactive illustrations highlight the signaling pathways that control stomatal opening and closing; in Labs and People.

### NETWATCH: Linding Lab

Read about current research in network biology and use online tools to explore phosphorylation networks; in Labs and People.

## SCIENCE CAREERS

[www.sciencereers.org/career\\_magazine](http://www.sciencereers.org/career_magazine)

Free Career Resources for Scientists

### A Zigzagging Path Points Straight to Success

*G. Koch*

Patricia Beckmann's career is one long lesson in how to succeed in science.

[http://scim.ag/koch\\_beckmann](http://scim.ag/koch_beckmann)

### Taken for Granted: Scarlet Letters

*B. L. Benderly*

Can young scientists publish without a mentor's support?

[http://scim.ag/tfg\\_scarlet](http://scim.ag/tfg_scarlet)

## SCIENCE TRANSLATIONAL MEDICINE

[www.sciencetranslationalmedicine.org](http://www.sciencetranslationalmedicine.org)

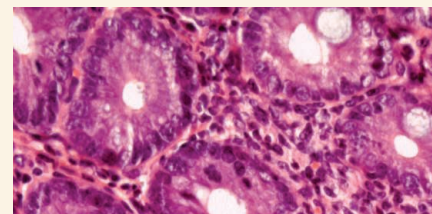
Integrating Medicine and Science

**2 March issue:** <http://scim.ag/stm030211>

### COMMENTARY: Atherosclerosis Drug Development in Jeopardy—The Need for Predictive Biomarkers of Treatment Response

*D. A. Fryburg and M. T. Vassileva*

The Atherosclerosis Working Group proposes the creation of an in silico model to identify biomarker panels for use in clinical trials.



## SCIENCE SIGNALING

Controlling immunosuppression in the gut.

### RESEARCH ARTICLE: Therapeutic Targeting of SPINK1-Positive Prostate Cancer

*B. Ateeq et al.*

### PERSPECTIVE: A Two-Step Toward Personalized Therapies for Prostate Cancer

*A. S. Goldstein et al.*

Therapeutic targeting of two proteins that drive tumorigenesis suggests personalized medicine is a possibility for prostate cancer.

### RESEARCH ARTICLE: Antisense Oligonucleotides Delivered to the Mouse CNS Ameliorate Symptoms of Severe Spinal Muscular Atrophy

*M. A. Passini et al.*

Central nervous system-directed antisense therapy ameliorates symptoms in a severe neuromuscular disorder in mice.

## SCIENCE PODCAST

[www.sciencemag.org/multimedia/podcast](http://www.sciencemag.org/multimedia/podcast)

Free Weekly Show

On the 4 March *Science* Podcast: Paleoindian seafaring, a Nipah virus outbreak in Bangladesh, peeling graphene, and more.

## SCIENCE INSIDER

[news.sciencemag.org/scienceinsider](http://news.sciencemag.org/scienceinsider)

Science Policy News and Analysis

**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 © 2011 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): \$149 (\$74 allocated to subscription). Domestic institutional subscription (51 issues): \$990; Foreign postage extra: Mexico, Caribbean (surface mail) \$55; other countries (air assist delivery) \$85. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request, GST #1254 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 \$25.00 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.



ADVANCING SCIENCE. SERVING SOCIETY

# Science

**331 (6021)**

*Science* **331** (6021), 1109-1214.

ARTICLE TOOLS

<http://science.sciencemag.org/content/331/6021>

PERMISSIONS

<http://www.sciencemag.org/help/reprints-and-permissions>

Use of this article is subject to the [Terms of Service](#)

---

*Science* (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. 2017 © The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works. The title *Science* is a registered trademark of AAAS.