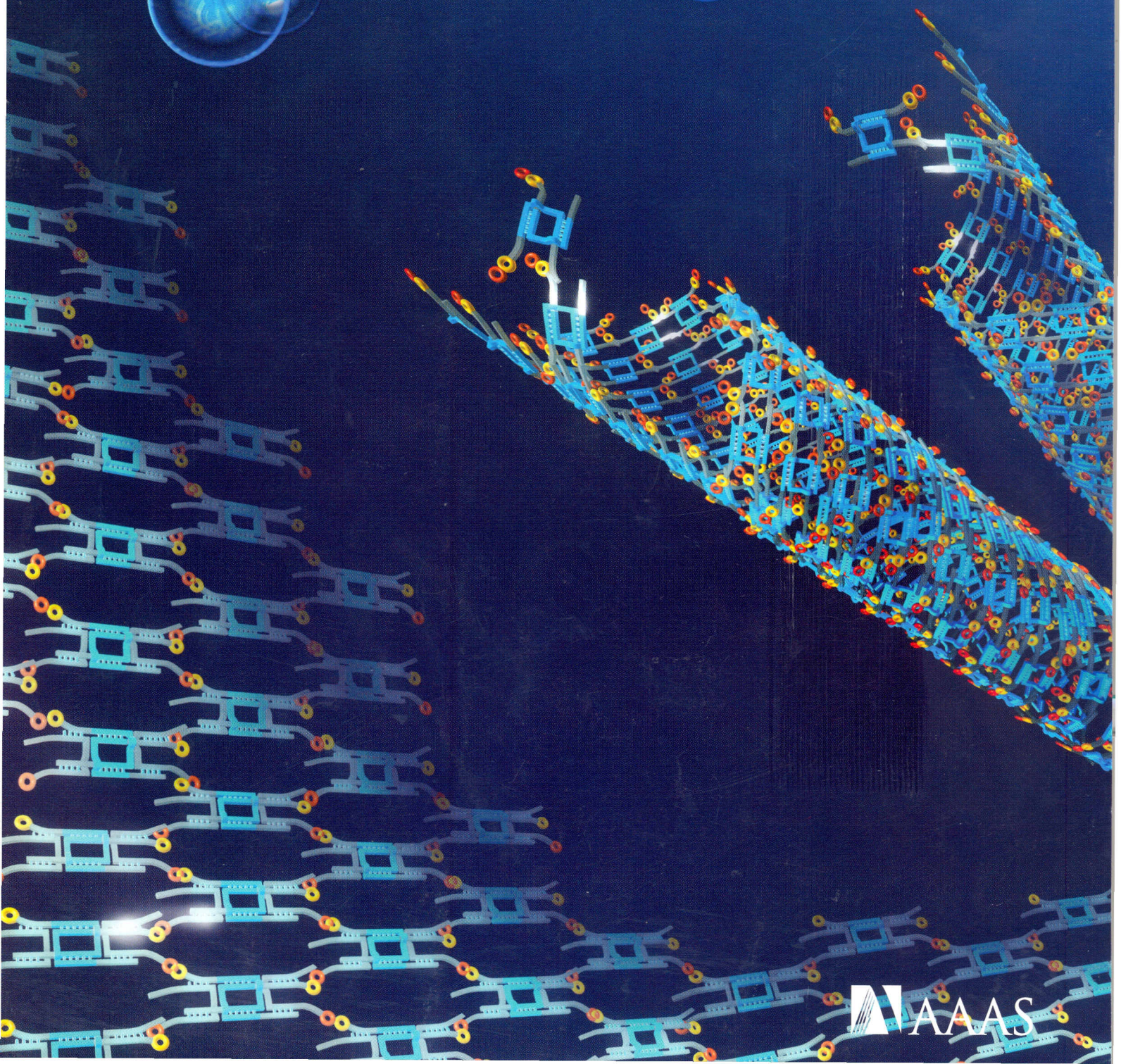


22 July 2011 | \$10

Science



EDITORIAL

- 385 Breakthroughs for Development
Rajiv Shah

NEWS OF THE WEEK

- 390 A roundup of the week's top stories

NEWS & ANALYSIS

- 393 Complexity Surrounds HIV Prevention Advances
394 New NSF Survey Tries to Separate Knowledge and Belief
395 Decrying CIA Vaccination Sham, Health Workers Brace for Backlash
396 Europe Unveils 'Radical' Plan to Reform Fishing Industry
397 Piloting Cancer Research With a Shrinking Budget

NEWS FOCUS

- 398 Why Do Parrots Talk?
Venezuelan Site Offers Clues
>> Science Podcast
401 Antarctic Ice's Future Still Mired in Its Murky Past
402 7th World Congress on Mummy Studies
In the Hands of Mummy Experts, Ancient Faces Gain New Life
One Sick Mummy Gets a Double Diagnosis
For Best Ticket to the Afterlife, Pay Up

LETTERS

- 404 Retraction
P. Sebastiani et al.
Invasives: A Major Conservation Threat
M. Lambertini et al.
Dolphin Research:
Arguing Against Captivity
L. Marino
Blame Testing, Not Teachers
D. Allchin
405 TECHNICAL COMMENT ABSTRACTS

BOOKS ET AL.

- 406 Run of the Red Queen
D. Breznitz and M. Murphree,
reviewed by D. Guthrie
407 Nostalgia for the Light
P. Guzmán, Director,
reviewed by S. Hameed

POLICY FORUM

- 408 Redesigning Flood Insurance
E. Michel-Kerjan and H. Kunreuther

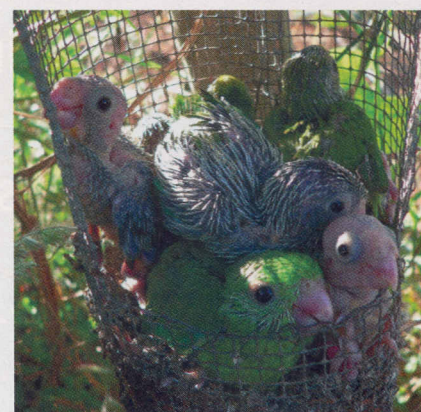
PERSPECTIVES

- 410 Revealing a Parasite's Invasive Trick
J. Baum and A. F. Cowman
>> Report p. 463
411 Seeing the Trees in Your Terrace
L. S. Kubatko and D. K. Pearl
>> Report p. 448
412 Bringing It Together with RNA
K. Thodey and C. D. Smolke
>> Report p. 470
413 Onset of Plate Tectonics
M. J. Van Kranendonk
>> Report p. 434
415 A Versatile Molecular Trap Built from Hydrogen-Bonded Tiles
J. W. Lauher
>> Report p. 436
416 Future Prospects for Cereals That Fix Nitrogen
P. H. Beatty and A. G. Good

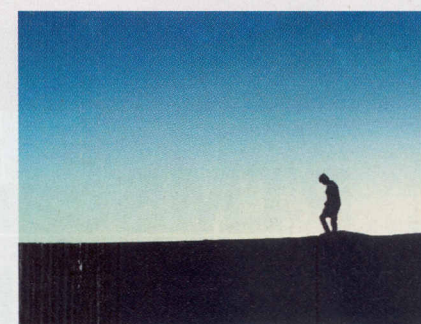
REVIEW

- 418 Projecting Coral Reef Futures Under Global Warming and Ocean Acidification
J. M. Pandolfi et al.
>> Science Podcast

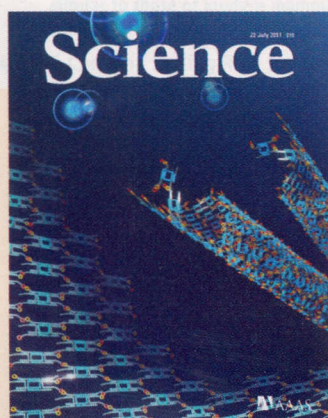
CONTENTS continued >>



page 398



page 407



COVER

Schematic representation of one- and two-dimensional RNA nanostructures, 100 to 200 nanometers in length, built from single-stranded RNA building blocks programmed to self-assemble within bacterial cells. On page 470, Delebecque *et al.* describe the design and use of these assemblies as scaffolds to spatially organize a hydrogen-producing biosynthetic pathway.

Image: Krista Shapton (Blot Media) and Faisal Aldaye (Harvard Medical School)

DEPARTMENTS

- 383 This Week in Science
386 Editors' Choice
388 Science Staff
478 New Products
479 Science Careers

BREVIA

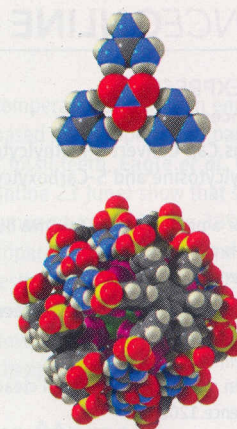
- 425** Altered Telomeres in Tumors with *ATRX* and *DAXX* Mutations
C. M. Heaphy et al.
Chromosome tips seem to be maintained by an unusual mechanism in tumors that have mutations in chromatin remodeling genes.

REPORTS

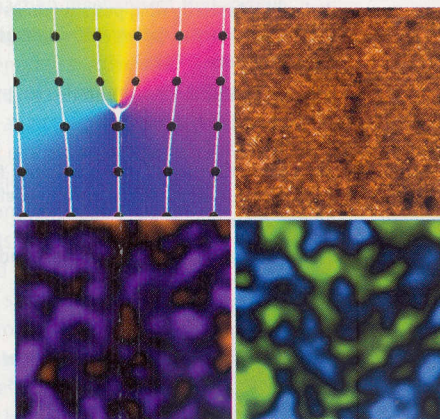
- 426** Topological Defects Coupling Smectic Modulations to Intra-Unit-Cell Nematicity in Cuprates
A. Mesaros et al.
A theoretical model explains how electronic states with different symmetries coexist and interact.
- 430** Atmospheric Carbon Injection Linked to End-Triassic Mass Extinction
M. Ruhl et al.
The end-Triassic mass extinction coincided with a massive release of carbon to the atmosphere and rapid climate change.
>> *Science Podcast*
- 434** Start of the Wilson Cycle at 3 Ga Shown by Diamonds from Subcontinental Mantle
S. B. Shirey and S. H. Richardson
Mineral inclusions in diamonds reveal that the modern pattern of continent movements began around 3 billion years ago.
>> *Perspective p. 413*
- 436** Supramolecular Archimedean Cages Assembled with 72 Hydrogen Bonds
Y. Liu et al.
Crystalline cages held together by hydrogen bonds can trap a wide range of molecules based on their size.
>> *Perspective p. 415*
- 440** Experimental and Theoretical Differential Cross Sections for a Four-Atom Reaction: $\text{HD} + \text{OH} \rightarrow \text{H}_2\text{O} + \text{D}$
C. Xiao et al.
A theoretical analysis of a four-atom reaction has a level of detail and accuracy previously restricted to three-atom systems.
- 443** Dinosaur Body Temperatures Determined from Isotopic (^{13}C - ^{18}O) Ordering in Fossil Biominerals
R. A. Eagle et al.
Large dinosaurs had body temperatures similar to those of modern mammals and birds.
- 445** A Common Scaling Rule for Abundance, Energetics, and Production of Parasitic and Free-Living Species
R. F. Hechinger et al.
Incorporation of energy flow between trophic levels yields a common scaling component for abundance in relation to body size.

- 448** Terraces in Phylogenetic Tree Space
M. J. Sanderson et al.
Analysis of terraces in phylogenetic space can inform on phylogenetic relationships with greater computational efficiency.
>> *Perspective p. 411*
- 451** 7000 Years of *Emiliania huxleyi* Viruses in the Black Sea
M. J. L. Coolen
Sequencing ancient DNA from a marine sediment traces population shifts of phytoplankton and their viruses over 7000 years.
- 453** De-AMPylation of the Small GTPase Rab1 by the Pathogen *Legionella pneumophila*
M. R. Neunuebel et al.
A bacterial pathogen reverses the modification of a host cell protein involved in membrane trafficking.
- 456** Cilia-Like Beating of Active Microtubule Bundles
T. Sanchez et al.
In vitro-assembled microtubule bundles exhibit oscillatory beating patterns and organize into metachronal waves.
- 459** Structural Basis of Type II Topoisomerase Inhibition by the Anticancer Drug Etoposide
C.-C. Wu et al.
Inhibition of an enzyme that alters DNA topology with an anticancer agent should facilitate development of better cancer drugs.
- 463** Host Cell Invasion by Apicomplexan Parasites: Insights from the Co-Structure of AMA1 with a RON2 Peptide
M. L. Tonkin et al.
The structure of a eukaryotic pathogen adhesin bound to its receptor provides a basis for design of therapeutics.
>> *Perspective p. 410*
- 467** Self-Recognition in Social Amoebae Is Mediated by Allelic Pairs of *Tiger* Genes
S. Hirose et al.
Polymorphic receptors prevent cheaters by avoiding altruistic cell death in *Dictyostelium*.
- 470** Organization of Intracellular Reactions with Rationally Designed RNA Assemblies
C. J. Delebecque et al.
Multidimensional RNA structures can act as scaffolds for the spatial organization of bacterial metabolism.
>> *Perspective p. 412*
- 474** Identity: Key to Children's Understanding of Belief
J. Perner et al.
"Theory of mind" is a domain-general cognitive capacity.

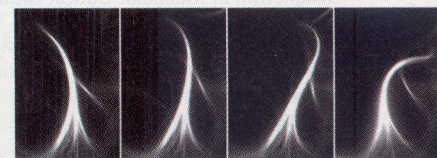
CONTENTS continued >>



pages 415 & 436



page 426



page 456

SCIENCEONLINE

SCIENCEEXPRESS

www.sciencexpress.org

Tet Proteins Can Convert 5-Methylcytosine to 5-Formylcytosine and 5-Carboxylcytosine
S. Ito et al.

Evidence for a possible route for DNA demethylation in animals is suggested.

10.1126/science.1210597

Synaptic Pruning by Microglia Is Necessary for Normal Brain Development

R. C. Paolicelli et al.

A good brain needs a good vacuum cleaner.

10.1126/science.1202529

Optix Drives the Repeated Convergent Evolution of Butterfly Wing Pattern Mimicry

R. D. Reed et al.

Heliconius butterfly wing pattern mimicry is driven by cis-regulatory variation of the *optix* gene.

10.1126/science.1208227

Impacts of Fishing Low-Trophic Level Species on Marine Ecosystems

A. D. M. Smith et al.

High harvest levels of low-trophic level fishes may have cascading marine ecosystem effects.

10.1126/science.1209395

The Persistently Variable "Background" Stratospheric Aerosol Layer and Global Climate Change

S. Solomon et al.

An increase in the amount of aerosols in the stratosphere during the past decade has decreased the rate of global warming.

10.1126/science.1206027

Quantum Simulation of Frustrated Classical Magnetism in Triangular Optical Lattices

J. Struck et al.

An optical lattice of trapped atoms provides a tractable and tunable setup to study complex magnetic interactions.

10.1126/science.1207239

TECHNICALCOMMENTS

Comment on "Activation of β -Catenin in Dendritic Cells Regulates Immunity Versus Tolerance in the Intestine"

K. M. Murphy

Full text at www.sciencemag.org/cgi/content/full/333/6041/405-a

Response to Comment on "Activation of β -Catenin in Dendritic Cells Regulates Immunity Versus Tolerance in the Intestine"

S. Manicassamy and B. Pulendran

Full text at www.sciencemag.org/cgi/content/full/333/6041/405-b

SCIENCENOW

www.sciencenow.org

Highlights From Our Daily News Coverage

Punching a Hole in Time

New 'time cloak' hides events that occur at a specific moment.

<http://scim.ag/timecloak>

'Asexual' Ants May Be Having Sex After All

Researchers turn up evidence of sperm in colonies full of female clones.

<http://scim.ag/asex-ants>

Cheating on the Beachmaster

Female elephant seals often avoid the harem and mate on the sly.

<http://scim.ag/beachmaster>

SCIENCE SIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment

19 July issue: <http://scim.ag/ss071911>

RESEARCH ARTICLE: The Deacetylase SIRT1 Promotes Membrane Localization and Activation of Akt and PDK1 During Tumorigenesis and Cardiac Hypertrophy

N. R. Sundaresan et al.
Deacetylation of Akt and its activating kinase PDK1 promotes cell growth in physiological and pathological settings.

RESEARCH ARTICLE: PreTCR and TCR $\gamma\delta$ Signal Initiation in Thymocyte Progenitors Does Not Require Domains Implicated in Receptor Oligomerization

J. Mahtani-Patching et al.

T cell receptor chains lacking oligomerization domains can drive the development of early thymocyte progenitors.

EDITORIAL GUIDE: Gatekeepers of Science and Society

H. Mistry and P. Toppin

Cells and society rely on information gatekeepers to identify problems and direct an appropriate response.

MEETING REPORT: Sequence, Structure, and Network Evolution of Protein Phosphorylation

C. S. H. Tan

Analysis of phosphorylation-based signaling systems provides insight into the evolution of these regulatory molecules.

SCIENCE TRANSLATIONAL MEDICINE

www.sciencetranslationalmedicine.org

Integrating Medicine and Science

20 July issue: <http://scim.ag/stm072011>

COMMENTARY: Teaching Biomedical Technology Innovation as a Discipline

P. G. Yock et al.

Universities are experimenting with initiatives that define an emerging academic discipline: biomedical technology innovation.

RESEARCH ARTICLE: Cardiac AAV9-S100A1 Gene Therapy Rescues Post-Ischemic Heart Failure in a Preclinical Large Animal Model

S. T. Pleger et al.

A protein that regulates cellular calcium, delivered by gene therapy, improves cardiac function in pigs with heart failure.

RESEARCH ARTICLE: A Common Mutation in the Defensin *DEFB126* Causes Impaired Sperm Function and Subfertility

T. L. Tollner et al.

PERSPECTIVE: Defending Male Fertility

S. Rozen

Evidence from functional studies and human genetics shows that a common variant in the *DEFB126* gene leads to reduced male fertility.

RESEARCH ARTICLE: Recurrent *GNAS* Mutations Define an Unexpected Pathway for Pancreatic Cyst Development

J. Wu et al.

A mutation in the gene *GNAS* serves as a marker for pancreatic cysts that can progress to become invasive adenocarcinomas, guiding therapy.

SCIENCE CAREERS

www.sciencereers.org/career_magazine

Free Career Resources for Scientists

Space Cadet

V. Venkatraman

As the shuttle makes its final orbits, scientist-astronaut Kathleen Rubins focuses on the future.

http://scim.ag/space_cadet

A Solo Career in Patent Law

S. Reed et al.

Engineer-turned-patent attorney Kate Hillis talks about starting over with a start-up of her own.

http://scim.ag/patent_law

SCIENCE PODCAST

www.sciencemag.org/multimedia/podcast

Free Weekly Show

On the 22 July *Science* Podcast: projecting coral reef futures, carbon release linked to the end-Triassic mass extinction, understanding parrot talk, and more.

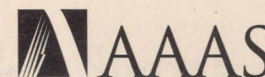
SCIENCE INSIDER

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 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