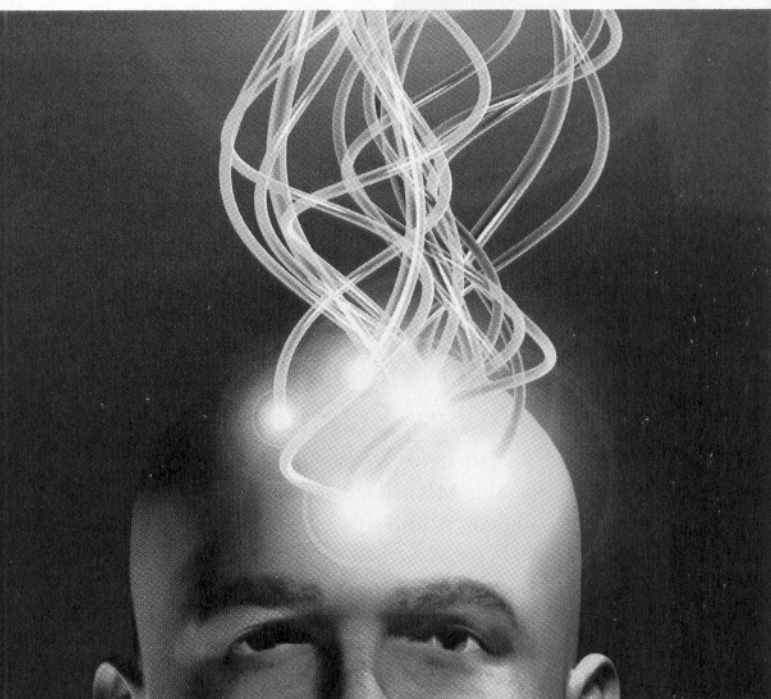


34 NEUROSCIENCE Jacking into the Brain

By Gary Stix

Science-fiction writers and futurists routinely describe a day when advances in neuroscience and information technology will make it possible to treat the human brain like an outsize flash drive: memories could be uploaded or downloaded, and complicated devices could be controlled with no more than a thought. But how close is any of that to reality?

Images by Kenn Brown
(wired head and metallic globe)



24 GEOENGINEERING A Sunshade for Planet Earth

By Robert Kunzig

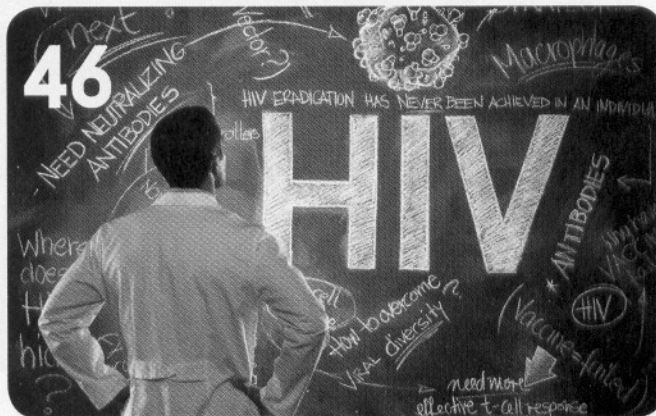
To avert global warming, some experts are willing to consider partly shielding the earth from the sun's rays.



40 PHYSICS The Long Arm of the Second Law

By J. Miguel Rubi

Seemingly in defiance of the second law of thermodynamics, nature is filled with examples of order emerging from chaos. A new theoretical framework resolves the apparent paradox.



SPECIAL REPORT

HIV 25 YEARS LATER:

46 The Big Challenges

47 The Vaccine Search Goes On

By David I. Watkins

The unfinished quest for an AIDS vaccine has become a search for new approaches to the problem.

54 Can HIV Be Cured?

By Mario Stevenson

Eliminating HIV from the body would require flushing the virus out of its hiding places.



ON THE COVER

Brain signals now can control a cursor or a prosthetic arm. How far will the human-machine interface go? Image by Kenn Brown.

INFORMATION SCIENCE

60 DNA Computers for Work and Play

By Joanne Macdonald, Darko Stefanovic and Milan N. Stojanovic

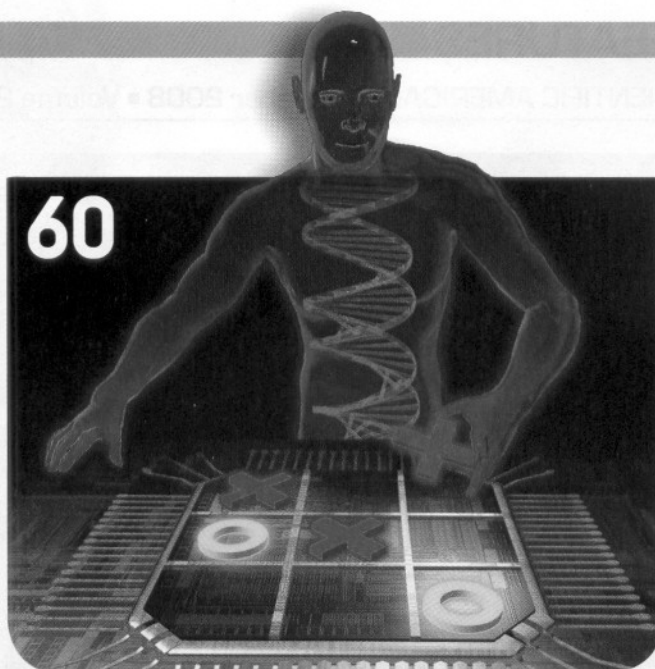
DNA logic gates may one day make medical decisions from within your bloodstream. For now, they play a mean game of tic-tac-toe.

INNOVATIONS

68 The Incredible Shrinking Scanner

By Bernhard Blümich

A portable MRI-like machine can probe the chemistry and structure of objects anywhere.



GO TO SCIAM.COM

FOCUS ON ALTERNATIVE ENERGY ▼

SciAm.com reporters walk through the various options in the alternative energy landscape: geothermal power, solar power, offshore wind, wave farms, thin film, hydrogen fuel-cell cars, electric cars, and more.

More at www.SciAm.com/nov2008



DAVID McNEW/Getty Images



News

The Key to Smaller, More Powerful Gadgets
As memory demands grow and devices shrink, current storage techniques won't cut it.



Mind Matters

Borderline Personality Disorder: No Man Is an Island
A new study provides an illuminating look into the brains of sufferers.



News

A Deep Thaw: How Much Will Vanishing Glaciers Raise Sea Levels?
Some say high, some say low, some say fast, some say slow.



Science Talk

Return of a Killer: Tuberculosis in Russia
Veteran journalist Merrill Goozner of the Integrity in Science project at the Center for Science in the Public Interest discusses the rise of tuberculosis in Russia.



Ask the Experts

What Is Histoplasmosis?
The U.S. Food and Drug Administration is ordering stronger warnings on a particular class of medications because of patient deaths from fungal infections.

Scientific American (ISSN 0036-8733), published monthly by Scientific American, Inc., 415 Madison Avenue, New York, N.Y. 10017-1111. Copyright © 2008 by Scientific American, Inc. All rights reserved. No part of this issue may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording for public or private use, or by any information storage or retrieval system, without the prior written permission of the publisher. Periodicals postage paid at New York, N.Y., and at additional mailing offices. Canada Post International Publications Mail (Canadian Distribution) Sales Agreement No. 40012504. Canadian BN No. 127387652RT; QST No. Q1015332537. Publication Mail Agreement #40012504. Return undeliverable mail to Scientific American, P.O. Box 819, Stn Main, Markham, ON L3P 8A2. Subscription rates: one year \$34.97, Canada \$49 USD, International \$55 USD. Postmaster: Send address changes to Scientific American, Box 3187, Harlan, Iowa 51537. Reprints available: write Reprint Department, Scientific American, Inc., 415 Madison Avenue, New York, N.Y. 10017-1111; (212) 451-8877; fax: (212) 355-0408. Subscription inquiries: U.S. and Canada (800) 333-1199; other (515) 248-7684. Send e-mail to sacust@sciam.com Printed in U.S.A.



4 From the Editor

5 Letters

7 50, 100 and 150 Years Ago

8 Updates

9 NEWS SCAN

- Backsliding on biodefense?
- Lessons from failed cancer vaccines.
- Debunking the media bias myth.
- Saving the world, one towel at a time.
- Resetting the morning line on extinction.
- Toward the insta-fridge.
- Out on a limb to sequence the salamander.
- Data Points: Recreational injuries add up.

OPINION

19 ■ SciAm Perspectives

Geoengineering: the wrong way to save the earth.

20 ■ Sustainable Developments

By Jeffrey D. Sachs

Don't pit today against tomorrow.

22 ■ Skeptic

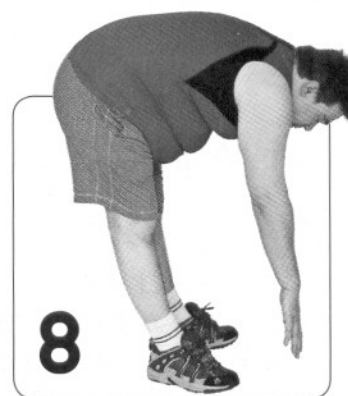
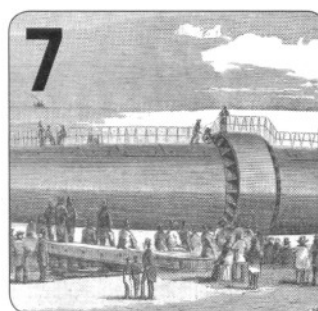
By Michael Shermer

Stage theories of human behavior have little evidentiary support.

23 ■ Anti Gravity

By Steve Mirsky

Hungry for science.



UNIVERSITY COMMUNICATIONS, UNIVERSITY OF CALIFORNIA, IRVINE

74 Insights

Ordained as a Dominican priest, geneticist and evolution advocate Francisco J. Ayala sees no conflict between the sacred and the scientific.

76 Working Knowledge

Microwave ovens.

78 Reviews

Quantum drama. Insect societies. The unification of forces.

80 Ask the Experts

What is touch DNA? Why do our eyelids get so heavy when we are tired?



19

23

80