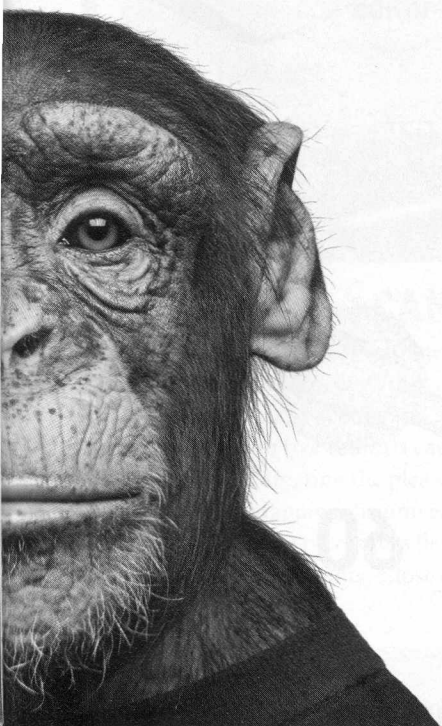




32

EVOLUTION

What Makes Us Human?

By Katherine S. Pollard

Comparisons of the genomes of humans and chimpanzees are revealing rare stretches of DNA that are ours alone.

PLANETARY SCIENCE

24 The Planetary Air Leak

By David C. Catling and Kevin J. Zahnle

Many of the gases that make up Earth's atmosphere and those of the other planets are slowly leaking into outer space. Will our world someday come to look like Venus?

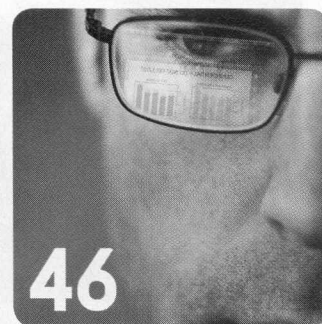
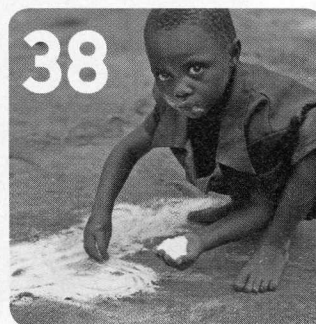


ENVIRONMENT

38 Could Food Shortages Bring Down Civilization?

By Lester R. Brown

The biggest threat to global stability is the potential for food crises in poor countries to cause government collapse. Those crises are brought on by ever worsening environmental degradation.



SECURITY

46 How to Steal Secrets without a Network

By W. Wayt Gibbs

Even the best network defenses cannot protect against a new paradox of data security: the very act of looking at secret information may give it away to the world.



ON THE COVER

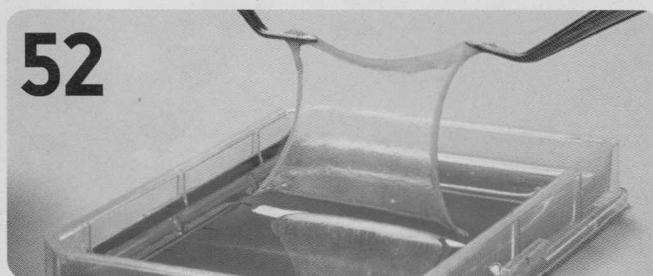
We share nearly 99 percent of our DNA with chimps, yet we differ profoundly. Insights into changes in the human genome reveal why. Photographs by Cary Wolinsky.

52 Progress in Tissue Engineering

BIOTECHNOLOGY

By Ali Khademhosseini, Joseph P. Vacanti and Robert Langer

Pioneers in building living tissue report advances toward the goal of replacing human organs.

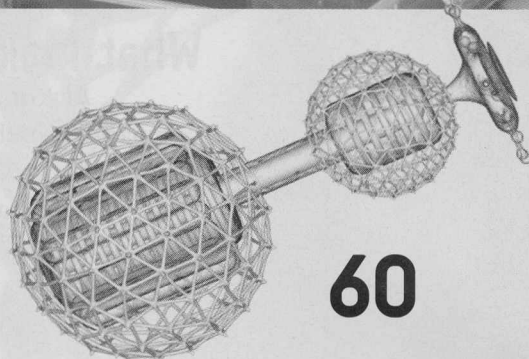


60 Powering Nanorobots

NANOTECHNOLOGY

By Thomas E. Mallouk and Ayusman Sen

Catalytic engines enable tiny swimmers to harness fuel from their environment and overcome the weird physics of the microscopic world.

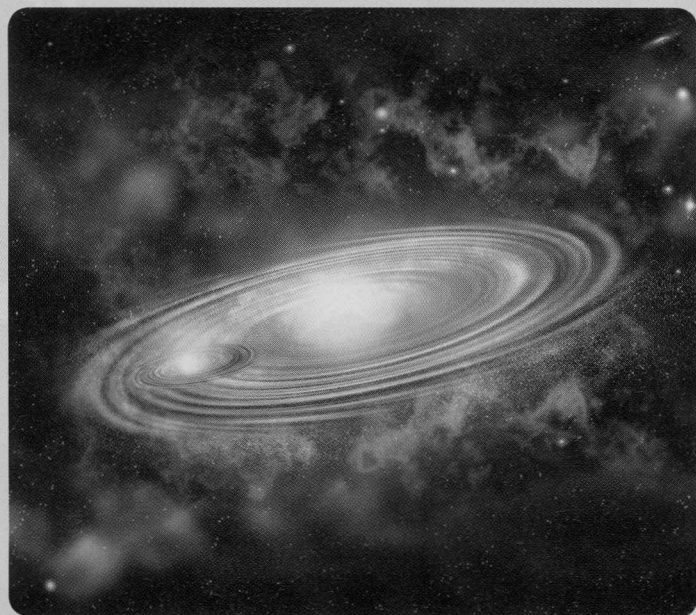


GO TO SCIAM.COM

60-SECOND SCIENCE BLOG: BLACK HOLES IN AN ORBITAL DANCE ▼

A recent paper presents compelling evidence of a galaxy harboring two closely spaced black holes.

More at www.SciAm.com/may2009



P. MARENFELD National Optical Astronomy Observatory/Association of Universities for Research in Astronomy/National Science Foundation

In-Depth Report

The Science of Baseball

As the boys of summer take the field, we look at the physics, chemistry and psychology that underpin the U.S. national pastime.

60-Second Psych Podcast

Where Is God?

New research supports critics of the idea that the brain has a "God spot" uniquely associated with religious faith and feelings.

Slide Show

Anatomy Lessons through the Ages

Medical books from centuries past give a glimpse into bygone studies of the human body.

News

Can Geothermal Power Compete with Coal on Price?

A report says geothermal energy is now cheaper per kilowatt-hour than coal-derived power, but there are plenty of caveats.

60-Second Earth Podcast

Electric Cars and Peak Lithium

What environmental challenges would the widespread adoption of electric cars pose?

Scientific American (ISSN 0036-8733), published monthly by Scientific American, Inc., 415 Madison Avenue, New York, N.Y. 10017-1111. Copyright © 2009 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.



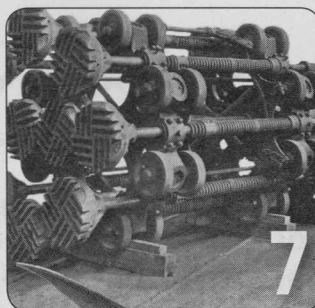
- 4 From the Editor
- 5 Letters
- 7 50, 100 and 150 Years Ago
- 8 Updates

9 NEWS SCAN

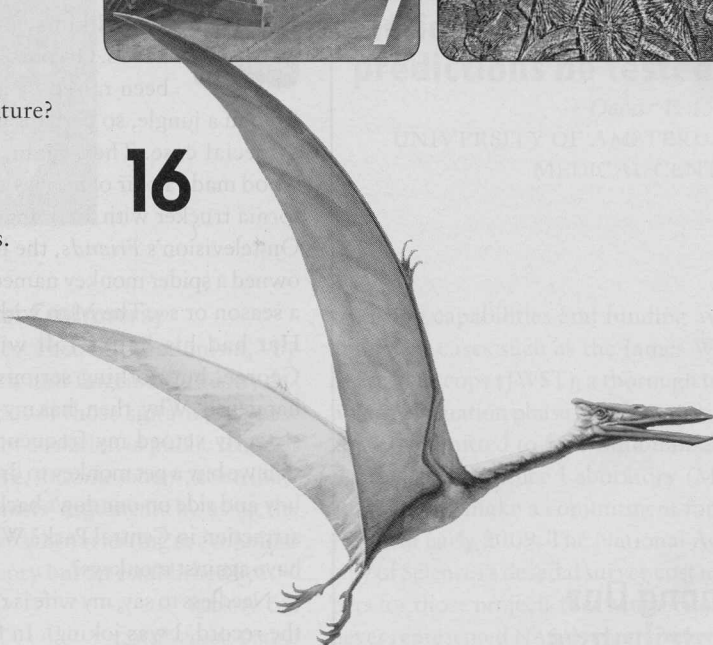
- Must war be an inevitable part of human culture?
- Cancer clues from embryonic development.
- Lazy bacteria and antibiotic resistance.
- Do free radicals cause aging?
- Targeting the pleasure center with electrodes.
- Mapping the universe with helium.
- How pterosaurs flew.
- Data Points: Close call with an asteroid.

OPINION

- 19 ■ **SciAm Perspectives**
We need to regulate in vitro fertilization.
- 20 ■ **Sustainable Developments**
By Jeffrey D. Sachs
Obama's reexpansion of the government's economic role is vital but will come at a significant cost.
- 21 ■ **Skeptic**
By Michael Shermer
Three types of creationists claim science supports their beliefs, yet they contradict one another.
- 22 ■ **Anti Gravity**
By Steve Mirsky
On a mission to save sloths.



16



JOE TUCCIARONE Photo Researchers, Inc.

- 66 **Reviews**
Dark universe. Manhattan circa 1609.
Human understanding.
- 68 **Ask the Experts**
How does food irradiation work?
Why don't trees outdoors lean toward the equator?

68

