Maddening Sense of Itch

How to Connect a **Quantum Computer**  ENVIRONMENT Replenishing Africa's Soil

# SCIENL AMERICAN

# Born Chaos

How raging bouts of interplanetary destruction built our solar system



# SCIENTIFIC AMERICAN

VOLUME 314, NUMBER 5



### ASTRONOMY

### 28 Born of Chaos

The solar system did not arise peacefully. Instead it came to be through staggering displays of interplanetary destruction.

By Konstantin Batygin,
Gregory Laughlin and
Alessandro More Pelli

**36 Planet Nine from Outer Space**By Michael D. Lemonick

### NEUROBIOLOGY

### 38 The Maddening Sensation of Itch

Only now is it becoming clear how this familiar feeling arises. By Stephani Sutherland

### ECOLOGY

### 44 Saving Eden

Conservationists are looking to preserve the remarkable wilderness of Myanmar by encouraging responsible ecotourism. The challenges are legion.

By Rachel Nuwer

### TECHNOLOGY

### 50 Quantum Connections

How do you make a big computer out of many atomic-scale ones? By Christopher R. Monroe, Robert J. Schoelkopf and Mikhail D. Lukin

### BIOMECHANICS

### 58 Swimmers under Pressure

The secret of jellyfish locomotion. By Josh Fischman

### LINGUISTICS

### 60 Language Wars

Who was responsible for spreading the world's most popular tongue: farmers or nomads? Scientists can't agree.

By Michael Balter

### ENVIRONMENT

### 66 A Cure for Africa's Soil

By growing perennial plants among food crops, African farmers can raise yields. By John P. Reganold and Jerry D. Glover



### ON THE COVER

Jupiter has played a key role in the solar system's evolution for more than 4.5 billion years. This artist's rendition shows a young, glowing Jupiter migrating through the sun's planet-forming disk of gas and dust. This migration may have destroyed a set of inner planets and cleared the way for Earth and other rocky worlds. Image by Kenn Brown, Mondolithic Studios.

# SCIENTIFIC AMERICAN







4 From the Editor

6 Letters

10 Science Agenda

Peddling drugs on TV is a lousy form of health education. *By the Editors* 

11 Forum

Don't overlook Venus, the most Earth-like planet in our solar system. *By Alexander Rodin* 

12 Advances

Automakers take on responsibility for crashes involving self-driving cars. A computer that knows when you're bored. Can you trust an aha! moment?

24 The Science of Health

Can we fix sickle-cell disease with gene editing? By Karen Weintraub

27 TechnoFiles

VR won't replace movies anytime soon. By David Pogue

70 Recommended

A biopic of mathematician Ramanujan. Mount St. Helens revisited. Hitler's atomic bomb. *By Clara Moskowitz* 

72 Skeptic

Malthus makes bad science policy. By Michael Shermer

73 Anti Gravity

Gorillas sing while they supper. By Steve Mirsky

74 50, 100 & 150 Years Ago

76 Graphic Science

The lightning hotspots of the world. By Mark Fischetti

ON THE WEB

Scientific American's Epic Math Battles

Which is larger: the number of Legos needed to build a life-size Egyptian pyramid or the number of trees on the earth? Test your estimation and calculation skills. Go to www.ScientificAmerican.com/may2016/epic-math

Scientific American (ISSN 0036-8733), Volume 314, Number 5, May 2016, published monthly by Scientific American, a division of Nature America, Inc., 1 New York Plaza, Suite 4500, New York, N.Y. 10004-1562. 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; TVQ1218059275 TQ0001. Publication Mail Agreement #40012504. Return undeliverable mail to Scientific American, P.O. Box 819, Stn Main, Markham, ON L3P 8A2. Individual Subscription rates: 1 year \$39.97 (USD), Canada \$49.97 (USD), International \$61 (USD). Institutional Subscription rates: Schools and Public Libraries: 1 year \$72 (USD), Canada \$77 (USD), International \$40 (USD). Businesses and Colleges/Universities: 1 year \$30 (USD), Canada \$333 (USD), Canada \$377 (USD), International \$42 (USD). Postmaster: Send address changes to Scientific American, Box 3187, Harlan, Iowa 51537. Reprints available: write Reprint Department, Scientific American, 1 New York Plaza, Suite 4500, New York, N.Y. 10004-1562; fax: 646-563-7138; reprints@SciAm.com. Subscription inquiries: U.S. and Canada (800) 333-1199; other (515) 248-7684. Send e-mail to scacustserv@cdsfulfillment.com. Printed in U.S.A.

Copyright © 2016 by Scientific American, a division of Nature America, Inc. All rights reserved.

Scientific American is part of Springer Nature, which owns or has commercial relations with thousands of scientific publications (many of them can be found at www.springernature.com/us). Scientific American maintains a strict policy of editorial independence in reporting developments in science to our readers.