

SCIENTIFIC AMERICAN

ScientificAmerican.com

Physics
On a
Subatomic
Quest

Medicine
Vaccines That
Fight Cancer

Geology
Afghanistan's
Buried Riches

WARPED by Dark Matter

Strange Effects on
the Milky Way

TAL REPORT
istry
ers



\$5.99 U.S. £4.30 U.K.

ON THE COVER



It's warped! The Milky Way galaxy, often depicted as a flat disk containing a spiral pattern of stars and gas, actually has a notable twist. The warp baffled astronomers until they realized that dark matter might form clumps and wrest the galactic disk into this shape. Dark matter also makes sense of other puzzles of our cosmic neighborhood. Image by Kenn Brown, Mondolith Studios.

SCIENTIFIC AMERICAN

Volume 305, Number 4



FEATURES

ASTROPHYSICS

22 The Dark Side of the Milky Way

Dark matter remains mysterious but is nonetheless helping to explain odd things about the galaxy we call home. *By Leo Blitz*

SPECIAL YEAR OF CHEMISTRY CELEBRATION 30 ATOM POWER

32 10 Unsolved Mysteries

The International Year of Chemistry reminds us that many outstanding questions in science and technology are, at their core, issues for chemists to solve. *By Philip Ball*

38 The Scent of Your Thoughts

Like other animals, humans unwittingly communicate by exchanging chemical signals. *By Deborah Blum*

GEOLOGY

42 Afghanistan's Buried Riches

Geologists working in the war-torn country say newfound deposits there could fulfill the world's desire for rare-earth and other critical minerals. *By Sarah Simpson*

MEDICINE

50 A New Ally against Cancer

The FDA recently okayed the first therapeutic vaccine against cancer, and other drugs that enlist the immune system to fight tumors are under study. *By Eric von Hofe*

FORENSICS

56 How Skulls Speak

As striking photographs show, the braincases of males and females differ in predictable ways. *By Anna Kuchment*

PHYSICS

58 Waiting for the Higgs

Even as the last protons spin through the most successful particle collider in history, physicists hope to conjure one final triumph. *By Tim Folger*

PALEONTOLOGY

64 The Dinosaur Baron of Transylvania

A maverick aristocrat's ideas about dinosaur evolution turn out to have been decades ahead of their time. *By Gareth Dyke*

BIOLOGY

68 Actuary of the Cell

Nobel Prize winner Elizabeth H. Blackburn explains why she thinks she can assess a person's health by examining tiny stretches of DNA at the tips of chromosomes. *Interview by Thea Singer*