

# The *Science* Family of Journals

Breakthrough evidence of a mysterious sub-atomic particle known as the Higgs boson, new insights to help protect the public from an avian influenza outbreak, and clues to understanding drug-resistant malaria were among the research findings reported in *Science*, *Science Translational Medicine* and *Science Signaling* in 2012. Science headlines encompassed research advances across the biological, physical and social sciences, plus penetrating news and analysis meant to expand our knowledge of devastating diseases, emerging technologies and more. See [www.sciencemag.org](http://www.sciencemag.org).

## **Chimp Viruses Could Support Hepatitis C Vaccine**

Two *Science Translational Medicine* studies hinted that vaccines developed with chimp vectors can trigger immune protection against hepatitis C, a virus that affects the liver and is estimated to infect 170 million people globally. There are currently no vaccines to protect against the infection. (Barnes *et al.*, and Colloca *et al.*, 4 January, *Science Translational Medicine*)

## **Pesticide Impacts on Bumblebee Colonies**

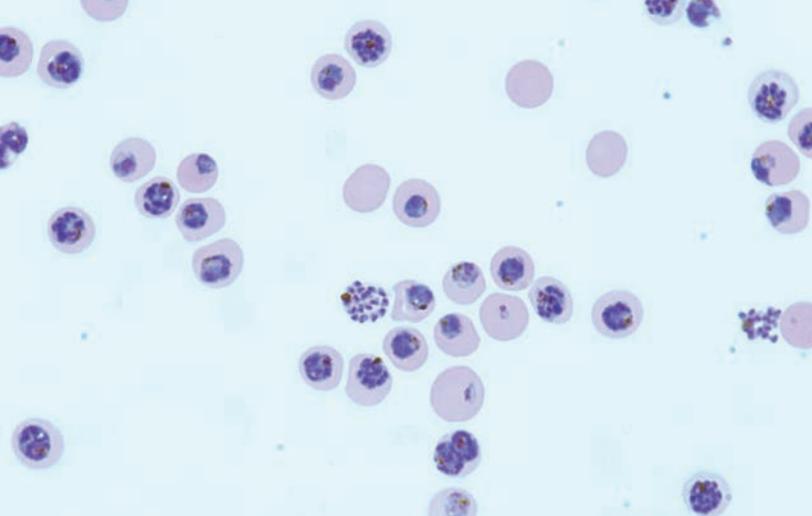
A pair of studies revealed the multiple ways that a widely used insecticide harms bumble-

bees and honeybees, which have been rapidly declining in recent years, in part due to a phenomenon known as Colony Collapse Disorder. Both studies looked at the effects of neonicotinoid insecticides, which are among the most widely used crop pesticides in the world. (Henry *et al.*, and Whitehorn *et al.*, 29 March)

## **Drug-Resistant Malaria in Southeast Asia**

Researchers have identified a particular region on a chromosome in *Plasmodium falciparum*—a major malaria parasite—that helps to explain how such parasites in Southeast Asia are developing resistance to the current genera-





tion of artemisinin-based drugs. (Cheeseman *et al.*, 6 April)

#### Traces of Majorana Fermions in Nanowires

Majorana fermions, elusive particles that act as their own antiparticles, were spotted inside the nanowires of an exotic superconductor device. These unique particles had never previously been sighted and may have potential for quantum computing platforms. (Mourik *et al.*, 12 April, *ScienceExpress*)

#### Preparing to Combat H5N1

Five changes to a strain of the H5N1 avian influenza virus were found to make the virus transmissible between ferrets via respiratory droplets. The findings underscored the risk that a similarly transmissible virus might evolve naturally and cause a human pandemic. The work should also assist efforts to develop global influenza bio-surveillance as well as drugs and vaccines to protect against this threat. The findings were published six months after researchers voluntarily agreed to halt H5N1 research amid international discussions on guidelines for conducting such work responsibly. *Science* made the research freely available: [www.sciencemag.org/hottopics/biosecurity/](http://www.sciencemag.org/hottopics/biosecurity/). (Fouchier

*et al.*, 22 June, special issue, and 19 January and 2 February, *ScienceExpress*)

#### Denisovans: Neandertal Relative's Genome Sequenced

Researchers described the complete sequence of the Denisovan genome, shedding light on the relationships between these archaic humans, who were closely related to Neandertals, and modern humans. (Pääbo *et al.*, 30 August *ScienceExpress*)

#### ENCODE Project: Eulogy for "Junk DNA"

A decade-long project, the Encyclopedia of DNA elements, or ENCODE, found that 80 percent of the human genome serves some biochemical purpose, debunking the notion that human DNA is loaded with useless bases. One study in *Science* found that many noncoding, disease-associated variants are located near regulatory DNA—an insight that might help unlock the genetic basis of complex human diseases. Another paper reported that a wide swath of the human genome is under evolutionary "constraint" and likely key to human-specific aspects of our biology. (Maurano *et al.*, and Ward and Kellis, 7 September)

#### The Secrets to Sterile Rice

A system of three genes seems to be responsible for hybrid sterility in rice, or the inability of many hybrid rice species to pass their genes on to the next generation. These findings suggest one way that hybrid sterility is maintained across rice species, and might suggest ways to improve this food stock. (Yang *et al.*, 14 September)

#### Polar Ice Sheets Losing Mass

All the major regions of the polar ice sheets





except one have been losing mass since 1992, according to a study that pulled together several independent measurement methods. The research overcame some limitations associated with satellite surveys. (Shepherd *et al.*, 30 November)

#### Early Results: GRAIL Mission to the Moon

Three studies based on the Gravity Recovery and Interior Laboratory mission offered a detailed lunar picture, encompassing the Moon's gravity field, and the density and characteristics of its crust, which appears to be cut by widespread sheets of cooled magma. (Zuber *et al.*, 5 December, *ScienceExpress*)

#### OTHER SCIENCE HIGHLIGHTS

Powerful Special Issues: *Science* published 13 substantive special issues on a range of topics, from "Working with Waste" and "Computational Biology," to "Disease Prevention" and "Black Holes." On 5 October, for example, a special issue on "Depression" investigated the relationship between neural deficits and major depressive disorder, and why some people may be more resilient to stress and trauma than others. For a special 13 July edition, award-winning *Science* news correspondent Jon Cohen, working with photographers Malcolm Linton and Darrow Montgomery, visited 10 U.S. cities, which are home to an estimated 1.2 million HIV-infected people, to describe the current state of "HIV/AIDS in America."

#### Breakthrough of the Year: The Higgs Boson

The observation of an elusive sub-atomic particle known as the Higgs boson was heralded by *Science* as the most important scientific discovery of 2012. Researchers

working with an atom-smasher at a particle physics laboratory near Geneva, Switzerland, known as CERN, on 4 July unveiled evidence of the Higgs boson, which holds the key to explaining how other elementary particles get their mass. A series of *Science* review articles helped to explain the technology used to observe this mysterious particle. Details were made freely available with registration: [www.sciencemag.org/special/btoy2012](http://www.sciencemag.org/special/btoy2012). (Negra *et al.*, The CMS Collaboration Team at CERN, and The ATLAS Collaboration at CERN, 21 December, *Science*)

Also in 2012, *Science* continued to make its high-quality news, analysis and research accessible across many technology platforms by offering "apps" for the iPhone as well as iTunes, iPad and Android devices.

#### Honors we brought in:

News reports by *Science* journalists Jennifer Couzin-Frankel and Gretchen Vogel were included in the 2012 edition of the *Best American Science Writing*. Couzin-Frankel's piece on "Aging Genes" examined the debate over the role of a class of proteins called sirtuins in cellular aging. Gretchen Vogel's piece, "Mending the Youngest Hearts," described progress with tissue-engineered blood vessels used to repair malformed hearts in very young children.

*Science* contributing correspondent Jon Cohen was named winner of the 2012 Victor Cohn Prize for Excellence in Medical Science Reporting. The award recognized his exemplary coverage of a broad range of biomedical topics, most notably his distinguished and persistent chronicling of the global HIV/AIDS epidemic.

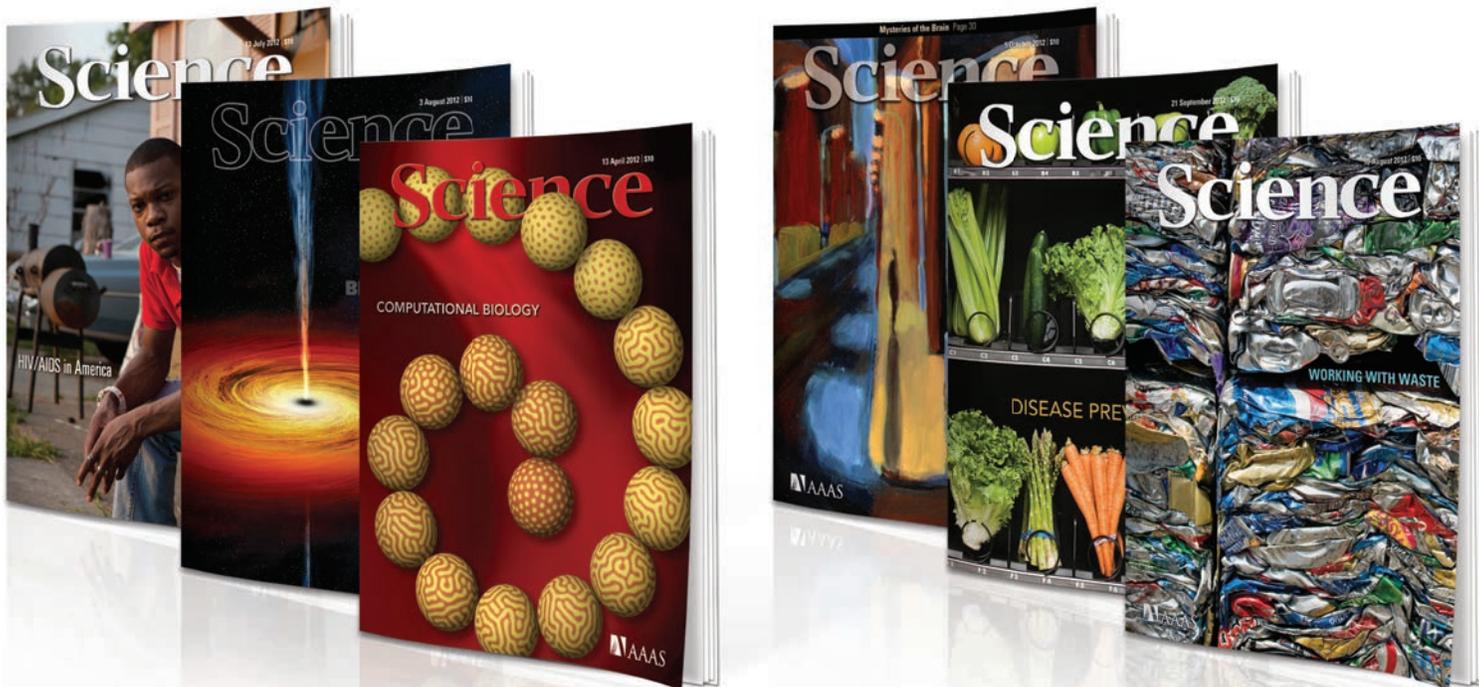
Yet another award was handed out to Cohen and *Science* journalist Martin Enserink, who

From left to right:  
Resistance to treatment with artemisinin-based drugs is currently emerging in malaria parasites in western Thailand. This photograph shows a camp for displaced persons.

*Plasmodium falciparum*-infected human red blood cells.

The midnight sun casts a golden glow on an iceberg and its reflection in Disko Bay, Greenland. Much of Greenland's annual mass loss occurs through calving of icebergs such as this, research suggests.

Neonicotinoid insecticides can harm bees such as this buff-tailed bumblebee, scientists say.



*Science* published 13 special issues in 2012 on topics ranging from disease prevention to computational biology.

received the American Society for Microbiology's 2012 Public Communications Award for their article, "False Positive." Their in-depth piece looked at a controversial study that linked a mouse retrovirus, XMRV, to chronic fatigue syndrome. The original research was partially retracted, and later, researchers at nine different laboratories reported that they were unable to reproducibly detect XMRV or relatives of the virus in blood samples.

*Science* news correspondent Ann Gibbons won the 2012 Anthropology in Media Award from the American Anthropological Association for a decade's worth of stories on human origins and evolution. Susan Gillespie, the chairperson of the Awards Committee, lauded Gibbons' "lucid accounts of advances in evolutionary anthropology."

#### Honors we gave out:

*Science*'s Inquiry-Based Instruction (IBI) Prize was developed to showcase outstanding materials for teaching introductory college science courses in a way that sparks students' natural curiosity about the world. In 2012, for instance, IBI Prize-winning essays published monthly in *Science* described a device developed by Rice University freshmen that could help doctors in Malawi to save the lives of gravely ill infants. Called Appropriate Design for Global Health, the device was designed to automatically shut off the

delivery of intravenous fluids being delivered to dehydrated infants, thus preventing over-hydration. "Improving science education is an important goal for all of us at *Science*," then Editor-in-Chief Bruce Alberts said. "We hope to help those innovators who have developed outstanding laboratory modules promoting student inquiry to reach a wider audience."

The 2012 Grand Prize winner of the international competition for The Eppendorf & *Science* Prize for Neurobiology was Marlene Cohen of the University of Pittsburgh, who was recognized for her outstanding research contributions into the neural basis of internal mental states. Established in 2002, the \$25,000 Eppendorf & *Science* Prize for Neurobiology is awarded annually for the most outstanding neurobiological research by a young scientist, 35 years of age or younger. Cohen's winning essay, "When Attention Wanders" explained that when our minds wander, so too do our perceptual abilities.