

# RESEARCH HIGHLIGHTS

Selections from the  
scientific literature

## NANOTECHNOLOGY

### Synthetic vaccines fight infection

Nanoparticle-encased vaccines can fend off lethal pathogens in animals, and could allow for a swift response to disease outbreaks.

Vaccines made from live virus can elicit long-lasting immunity, but most are slow and laborious to make. Daniel Anderson at the Massachusetts Institute of Technology in Cambridge and his colleagues instead made a fully synthetic vaccine by encasing antigen RNA in a modified-polymer nanoparticle that protected the RNA from degradation.

Single injections of such vaccines against the Ebola virus and the influenza virus, as well as the parasite *Toxoplasma gondii*, were sufficient to generate immune responses in mice and to protect the animals against otherwise lethal doses of the pathogens.

*Proc. Natl Acad. Sci. USA*  
<http://doi.org/bk45> (2016).

## EVOLUTION

### Double disaster killed dinosaurs

The extinction of the dinosaurs some 66 million years ago was triggered by massive volcanic eruptions in India, and cemented by the arrival of the Chicxulub meteorite in Mexico.

The two events occurred within a few hundred thousand years of one another, making it difficult to tell which drove three-quarters of life on Earth — including the dinosaurs — to extinction. Sierra Petersen at the University of Michigan in Ann Arbor and her co-workers studied a fossil record of mollusc shells from Seymour Island in Antarctica, and used isotope analysis to estimate past temperature

change. An 8°C spike marking the onset of the Deccan Traps volcanic eruptions is followed by a smaller spike some 150,000 years later, coinciding with the Chicxulub impact.

The scientists conclude that the meteorite delivered the final blow to ecosystems already weakened by the eruptions.

*Nature Commun.* 7, 12079 (2016)

## OCEAN SCIENCE

### Ice extent changes with the wind

The rate and pattern of summer sea-ice retreat in the Arctic vary markedly from year to year and are driven by multiple atmospheric trends.

Amanda Lynch of Brown University in Providence, Rhode Island, and her team compared atmospheric circulation and Arctic sea-ice trends from 1979 to 2014. Mild summers with warm winds out of Canada and Alaska were associated with marked sea-ice retreat. During cooler summers, warm southerly winds from Siberia tended to favour sea-ice accumulation in the Beaufort Sea and the Canadian Archipelago. In other years, cold winds from the north continually replenished melting sea ice along the southern fringes of the Arctic Ocean.

Understanding how sea ice responds to atmospheric

Few exoplanets have been imaged directly, but the scientists took a series of pictures of a gas-giant planet roughly four times the mass of Jupiter, orbiting the brightest of the three stars. Simulations suggest that it is in a wide, stable orbit, rather than being in the process of being tossed out of the system by gravitational interactions between the stars.

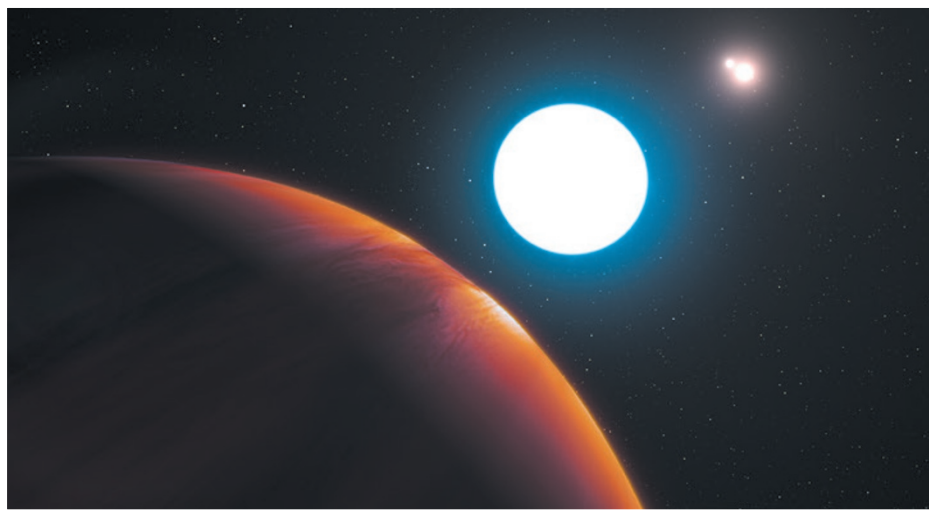
*Science* <http://doi.org/bk47> (2016)

## HEALTH

### Poor child growth cements poverty

Stunted childhood growth in developing countries results in educational deficits and substantial economic losses.

Using published data on early-childhood growth and the financial benefits of education for 137 developing nations, Günther Fink at the Harvard T. H. Chan School of Public Health in



ESO/L. CALÇADA/M. KORNMESSER

## PLANETARY SCIENCE

### Triple star hosts stable planet

An extrasolar planet in an exotic triple-star system lives in surprising harmony with the three suns hanging in its sky.

Kevin Wagner of the University of Arizona in Tucson and his colleagues used the European Southern Observatory's Very Large Telescope in Chile to study the star system HD 131399, which lies about 98 parsecs from Earth in the constellation Centaurus.