

# RESEARCH HIGHLIGHTS

Selections from the scientific literature

## BIOCHEMISTRY

### Machine mimics ribosome

The cell's protein-building complex has inspired the development of a molecular machine that links amino acids together.

David Leigh at the University of Manchester, UK, and his colleagues based their 'nanomachine' on the ribosome, a complex of proteins and RNA that translates the genetic code into proteins. But, compared with the ribosome, their machine is primitive and slow, and can assemble only very short protein chains called peptides. The nanomachine is based on a rotaxane, which is a large molecular ring threaded onto a molecule that acts as an axle. In the experiment, the axle is lined with three amino acids, and a chain of three amino acids hangs from the outer edge of the ring. When the machine is heated, an amino acid from the axle is transferred to the end of the hanging chain. The ring can then move along the axle, repeating the reaction.

Running about  $10^{18}$  molecular machines at once produces tens of milligrams of peptide.

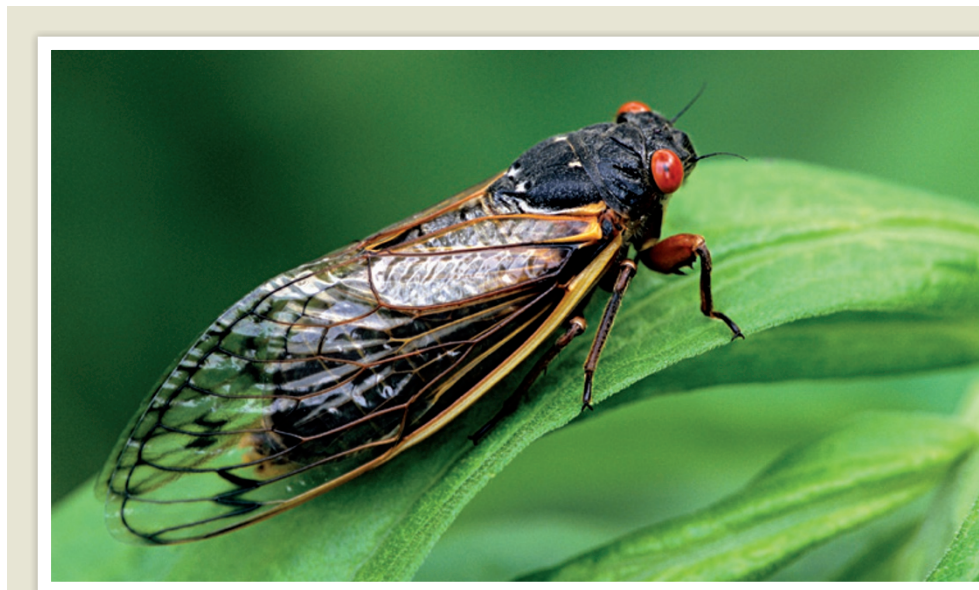
*Science* 339, 189–193 (2013)

For a longer story on this research, see [go.nature.com/p3rtai](http://go.nature.com/p3rtai)

## HUMAN EVOLUTION

### Migration from India to Australia

A genetic analysis indicates that humans migrated from India to Australia around 4,000 years ago. This contradicts the prevailing view that, after its initial colonization, Australia had little contact with the rest of the world before the late



ED RESCHKE/PETER ARNOLD/GETTY

## ECOLOGY

### Cicadas emerge when predators decline

Periodical cicadas, which spend most of their lives underground and occasionally emerge en masse, may time their appearances with periodic dips in predator numbers.

Why several species of the insect (*Magicicada* spp; pictured) surge to the surface of North American forests after 13 or 17 years underground has been a mystery. Walt Koenig at Cornell University in Ithaca, New York, and Andrew Liebhold of the US Department of Agriculture Forest Service in Morgantown, West Virginia, analysed data on the population

sizes of 15 bird species between 1966 and 2010 to estimate the predation pressure on the insects. They conclude that the cicadas somehow set their predators' populations into cycles that reduce bird numbers during their next foray above ground.

This could be explained by the insects' long-lasting effect on forest ecology influencing factors such as nutrient levels and tree growth for several years after their emergence, the authors suggest.

*Am. Nat.* 181, 145–149 (2013)

eighteenth century.

Irina Pugach at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, and her colleagues analysed genome-wide genetic variation from 344 people, including Australian Aboriginals and individuals from Africa, India and island Southeast Asia. The authors found evidence of a migration out of Africa into Australia at least 36,000 years ago, and one from India about 4,230 years ago.

The Australian archaeological record

shows rapid changes in tool technology around 4,000 years ago, leading the authors to suggest that the migrants could have brought in the new technology.

*Proc. Natl Acad. Sci. USA* <http://dx.doi.org/10.1073/pnas.1211927110> (2013)

## NEUROSCIENCE

### Hearing restored with new hair cells

An experimental drug can restore hearing in deaf mice by regenerating sound-sensitive

cells in the inner ear.

Excessive noise permanently damages hair cells that conduct sound to the brain and are found in an inner-ear structure called the cochlea. A team led by Albert Edge at Harvard Medical School in Boston, Massachusetts, has identified a molecule that can convert other cochlear cells into hair cells. The compound, named LY411575, blocks a biochemical pathway called Notch, which normally prevents supporting cells in the cochlea from developing