

# RESEARCH HIGHLIGHTS

Selections from the scientific literature

## METABOLISM

### Diet restriction makes fat brown

Very low-calorie diets — shown to boost longevity in some mammals — can turn white, energy-storing fat into beige, energy-burning fat in mice.

Calorie restriction and the accumulation of beige and brown fat have both been associated with metabolic benefits such as increased sensitivity to insulin. To look for a link between the two, Mirko Trajkovski of the University of Geneva in Switzerland and his colleagues cut the calories given to normal-weight and obese mice by 40% and found that this triggered the browning of white fat into beige fat in both types of animal.

The restricted diet also raised the levels of certain immune-system proteins called cytokines. Mice that were genetically engineered to lack responses to these cytokines did not turn fat beige in response to caloric restriction — and also did not experience many of the metabolic benefits.

*Cell Metab.* <http://dx.doi.org/10.1016/j.cmet.2016.07.023> (2016)

## NEUROSCIENCE

### Memory trick dampens phobia

Recalling fearful memories shortly before receiving psychological therapy could help people to diminish long-held fears.

Once retrieved, a memory can be disrupted before it is reconsolidated — returned to long-term storage in the brain. In a study of people with a lifelong fear of spiders, Johannes Björkstrand and

his colleagues at Uppsala University in Sweden presented volunteers with pictures of spiders to activate their fear memory. They then performed exposure therapy (repeatedly showing pictures of spiders) either 10 minutes later, during memory reconsolidation, or six hours later, after reconsolidation had finished.

In a comparison of the two groups the following day, those who were treated at 10 minutes showed reduced activation in the amygdala — a brain area that mediates fear — while

viewing pictures of spiders. They were also more likely to choose to view a picture of a spider in exchange for money. *Curr. Biol.* <http://dx.doi.org/10.1016/j.cub.2016.08.022> (2016)

## PARTICLE PHYSICS

### Exotic pentaquark confirmed

After multiple false detections, physicists have now confirmed in a pair of studies the existence of

subatomic particles known as 'pentaquarks'.

In the standard model, particles called baryons, which make up most of the visible matter in the Universe and include protons and neutrons, are built from three fractionally charged objects called quarks. Theorists have predicted that quarks could aggregate into larger groups and have speculated for years about the short-lived pentaquark, composed of four quarks and an antiquark. Now researchers at the LHCb experiment at



JEREMY HORNER/CORBIS/VCG/GETTY

## HYDROLOGY

### South Asia water supplies at risk

Groundwater supplies in northern India, Pakistan, Nepal and Bangladesh could be more endangered by contamination than by depletion.

The Indo-Gangetic Basin includes the Indus, Ganges and Brahmaputra river systems and is one of the world's most heavily used freshwater reservoirs. Previous low-resolution satellite data suggested that current exploitation rates are unsustainable. To study the region in greater detail, Alan MacDonald at the British Geological Survey in Edinburgh and his colleagues examined records from nearly 3,500 water

wells and other high-resolution data to estimate groundwater levels and quality within the top 200 metres of the aquifer. The team found that 60% of the system was plagued with high levels of salt, arsenic and other pollutants. But across 70% of the aquifer, the water table has been stable, or has even risen, from 2000 to 2012.

Groundwater quality should be monitored to provide data for policymakers, the authors suggest.

*Nature Geosci.* <http://dx.doi.org/10.1038/ngeo2791> (2016)