

RESEARCH HIGHLIGHTS

Selections from the scientific literature

CONDENSED-MATTER PHYSICS

Frozen bismuth superconducts

Bismuth crystals can act as superconductors — but only at temperatures approaching absolute zero.

Researchers have long been searching for new superconducting materials, which have the ability to maintain an electric current with no power source. A team led by Srinivasan Ramakrishnan at the Tata Institute of Fundamental Research in Mumbai, India, showed that bismuth crystals become superconducting if they are brought down to 0.5 millikelvin. This extreme cooling is necessary because, unlike other superconductors, bismuth has a very low density of charge carriers, with just 1 electron per 100,000 atoms.

The standard theory of superconductivity can explain the phenomenon in other metals, such as lead and aluminium, but not in bismuth, so further study is needed, the authors say.

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

VACCINES

New way to tame a virus

A live, genetically modified flu virus can infect animals and trigger a strong immune response, but cannot multiply

in its host's cells. Such modified viruses could one day be used to improve on current vaccines (**pictured**).

Vaccines made of live viruses elicit stronger protective immune responses than inactivated vaccines, but, because they can replicate, have the potential to cause disease. To overcome this, Demin Zhou and his colleagues at Peking University in Beijing genetically altered the influenza A virus so that it

could be produced efficiently by special transgenic cells, but could not replicate in normal cells or in infected animals. When compared with a commercially available inactivated flu vaccine, the modified virus stimulated stronger immune reactions in mice, ferrets and guinea pigs. Mice given the new vaccine and then infected with the unmodified flu virus survived, whereas all unvaccinated mice died. *Science* 354, 1170–1173 (2016)

MICROBIOLOGY

Gut bacteria linked to Parkinson's

Bacteria living in the gut may contribute to movement problems seen in disorders such as Parkinson's disease.

Timothy Sampson and Sarkis Mazmanian at the California Institute of Technology in Pasadena and their team generated mice that lacked their own bacteria and had been genetically engineered so



PALAEANTHROPOLOGY

Early burials had mutilation rituals

Ancient humans in South America used complex funeral rituals and manipulated the bodies of their dead as early as 10,000 years ago.

André Strauss at the University of Tübingen in Germany and his colleagues analysed bones from 26 human burials, discovered during 15 years of archaeological excavations in a cave in east-central Brazil (pictured). They found that the remains were treated before and during burial in a variety of ways, including defleshing

and tooth removal. Bones dating to roughly 9,500 years ago showed signs of dismemberment and burning before being carefully arranged, suggesting a ceremonial burial. Similar practices were known in the Andes from this period but not in eastern South America.

The authors say these ritualized burials may have been important in maintaining social cohesion in times of stress and conflict. *Antiquity* 90, 1454–1473 (2016)



MAURICIO DE PAIVA

BRIAN SNYDER/REUTERS