

RESEARCH HIGHLIGHTS

Selections from the
scientific literature

ECOLOGY

Longing for home undid cave bears

When looking for a spot to hibernate, ancient cave bears stuck with family.

Cave bears (*Ursus spelaeus*) went extinct 24,000 years ago, whereas the related brown bears (*Ursus arctos*) still thrive. To explain these differing fates, a team led by Gloria Fortes and Axel Barlow at the University of Potsdam, Germany, obtained mitochondrial genomes of 31 cave bears and 15 ancient brown bears from caves in Spain. Cave bears from the same caves tended to share mitochondrial DNA, which is inherited maternally, whereas brown-bear caves contained multiple maternal lines.

These patterns suggest that cave bears nearly always hibernated in their native caves, which may have contributed to their demise in the face of competition from other bears, the scientists say.

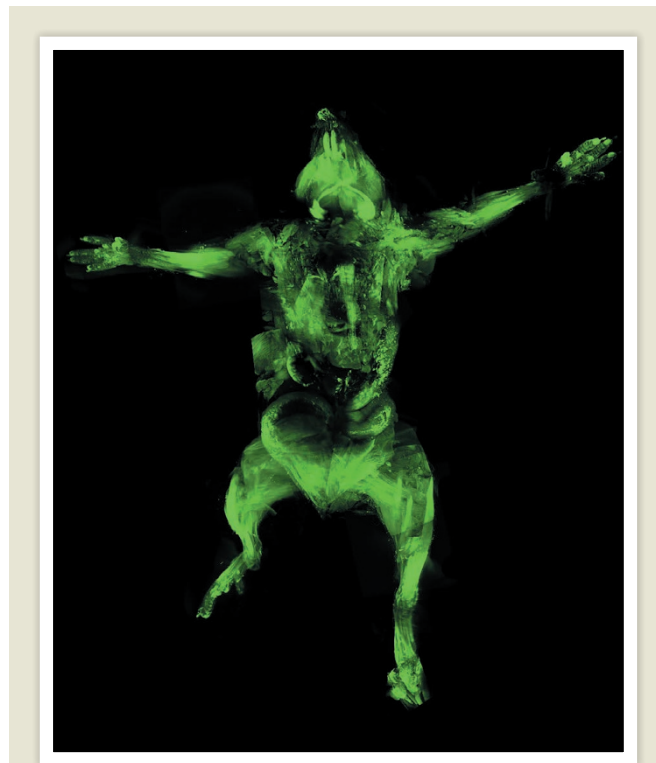
Mol. Ecol. <http://doi.org/bpgr> (2016)

ECONOMICS

Satellites map world poverty

Computer scientists have used satellite imagery and machine-learning techniques to make detailed maps of regions where poverty is common.

Neal Jean and his colleagues at Stanford University in California focused on Nigeria, Tanzania, Uganda, Malawi and Rwanda and combined various data sets, including daytime images that identify features such as paved roads and metal roofs, to estimate local household consumption



CELL BIOLOGY

See-through rodents

An imaging technique lets scientists peer through the skin of a whole mouse or rat to examine its organs after death.

Ali Ertürk of the Ludwig Maximilians University of Munich in Germany and his colleagues created a technique called ultimate DISCO (uDISCO), which removes pigments and lipids from the tissues of dead animals using an organic solvent. This leaves the organs and skin intact but transparent, while preserving genetically encoded fluorescent proteins. The method revealed the nervous system of a mouse in stark detail.

uDISCO also shrinks bodies by up to 65%, making it possible to image whole animals using light-sheet microscopy, which excels at imaging smaller samples.

Nature Methods <http://dx.doi.org/10.1038/nmeth.3964> (2016)

and income. When identifying areas where incomes are below the international poverty line of US\$1.90 per person per day, the team's algorithm outperforms night-light maps (an alternative but limited indicator of economic activity). It also probes hard-to-reach areas, including

regions not accessed by household surveys — such as those conducted by the World Bank — which are costly and infrequently conducted.

The method could prove useful for targeting social programmes and determining when and where they fail.
Science 353, 790–794 (2016)

GENOMICS

Medicine less precise for some

A lack of ethnic diversity in people whose genomes have been sequenced is complicating precision medicine for people with non-European ancestry.

David Goldstein of Columbia University in New York City and Slavé Petrovski of the Royal Melbourne Hospital in Australia examined data from the Exome Aggregation Consortium (ExAC), which contains sequences from 60,252 people, 60.9% of whom have European ancestry. When they compared genetic variants from a cohort of 5,094 people with variants found in the ExAC and other data sets, the comparisons yielded a shorter list of potentially causative variants in people with European ancestry (6.6, on average) than in people with non-European ancestry (9.9–12.7 candidate variants, depending on ethnicity).

Precision medicine is much more precise for people with European than non-European ancestry owing to undersampling of non-European populations, the authors write.

Genome Biol. <http://doi.org/bphp> (2016)

PARTICLE PHYSICS

Neutrino search closes in

Scientists are getting closer to discovering whether neutrinos and antineutrinos are in fact the same particles — known as Majorana neutrinos.

The theory, proposed by Italian physicist Ettore Majorana in the 1930s, could

explain why neutrinos have mass and why the Universe contains more matter than antimatter. Azusa Gando at Tohoku University in Sendai, Japan, and her colleagues in the KamLAND-Zen Collaboration carried out the most sensitive search so far for radioactive decay indicative of Majorana neutrinos, using an underground detection facility containing a huge balloon filled with purified xenon.

The team's results, although negative, constrain the upper limit of the mass of Majorana neutrinos to 61–165 millielectronvolts. However, the detector's sensitivity must be pushed even further to prove Majorana's theory, the researchers say.

Phys. Rev. Lett. 117, 082503 (2016)

MATERIALS SCIENCE

Bulk production of mother-of-pearl

Artificial mother-of-pearl can be made by mimicking the natural process of mineralization.

Mother-of-pearl, or nacre, is remarkably strong yet biodegradable. However, its complex layered structure, in which mineral plates form in an organic scaffold, makes it difficult to recreate in bulk. Shu-Hong Yu at the University of Science and Technology of China in Hefei and his colleagues built their own matrix by growing sheets of ice, which squeezed a solution of the biopolymer chitosan into solid layers. They then pumped this scaffold with materials to grow calcium carbonate, and pressed the stack to form synthetic nacre.

The synthetic version has similar mechanical properties to its natural counterpart and takes just two weeks to grow. This method could be used to produce materials for use in the aerospace industry or as armour, say the authors. *Science* <http://doi.org/bpk2> (2016)

ASTRONOMY

Dark-matter evidence weakens

A survey of X-ray light from galaxy clusters has found no evidence of dark matter decaying, in the latest in a series of contradictory results.

In 2014, two separate teams found an unexpected bump in the energy spectra of dozens of galaxy clusters. Emissions at 3.55 kiloelectronvolts (keV) were seen as a possible sign of the decay of 'sterile' neutrinos with a mass of 7.1 keV. Physicists have hypothesized that these heavier cousins of the three known types of neutrino are possible components of dark matter.

Now astronomer Florian Hofmann at the Max Planck Institute for Extraterrestrial Physics in Garching, Germany, and his team have analysed publicly available data from the Chandra X-ray Observatory concerning 33 galaxy clusters (11 of which were not included in the original studies). Their search found no evidence of an anomalous bump at around 3.55 keV.

Astron. Astrophys. 592, A112 (2016)

ANTHROPOLOGY

Early humans were picky dressers

Ancient clothing is rarely preserved, but two independent teams have discovered what early humans wore to cope with the cold European weather.

Mark Collard at Simon Fraser University in Burnaby,



Canada, and his colleagues compared the animals that modern indigenous groups used to make cold-weather clothing with the bone types found at early human and Neanderthal sites. Remains from animals with fur, such as foxes and rabbits, were more common at early-human sites, whereas bones from deer, bovids and several other animals were found at both types of site equally. This suggests that early humans used fur to sew specialized cold-weather apparel, but that Neanderthals relied on simpler animal-skin capes, the authors say.

In a separate paper, Niall O'Sullivan at the Institute for Mummies and the Iceman in Bolzano, Italy, and his team sequenced mitochondrial DNA from garments worn by Ötzi, the 5,300-year-old ice mummy. His coat, leggings (pictured left) and loincloth were made from the skins of domestic cattle, sheep and goats, whereas his hat and quiver (pictured right) used brown-bear fur and roe-deer skin.

J. Anthropol. Archaeol. <http://doi.org/bn82> (2016); *Sci. Rep.* 6, 31279 (2016)

EVOLUTION

New dolphin species found

A fossilized dolphin skull in the Smithsonian collection has been identified as an entirely new species 65 years after it was dug out of the ground in Alaska.

Alexandra Boersma and Nicholas Pyenson of the Smithsonian Institution's National Museum of Natural History in Washington DC identified a 23-centimetre-long skull (pictured) as a new genus and species in a family called the Allodelphinidae. The extinct animal is closely related to today's South Asian river dolphin (*Platanista gangetica*). The fossil dates from around 25 million years ago, a few million years after cetaceans diverged into



toothed whales and filter-feeding baleen whales, and is one of the earliest examples found of the former group.

It is also the most northern specimen yet discovered of the Allodelphinidae, and the researchers have dubbed the animal *Arktocara yakataga* — the face of the north.

PeerJ 4, e2321 (2016)

CELL BIOLOGY

Stem cells predict drug safety

Heart muscle cells derived from individual patients' stem cells could be used to test the safety of a drug before it's administered — a boon for precision medicine.

Elena Matsa and Joseph Wu of Stanford University in California and their colleagues made heart muscle cells from induced pluripotent stem cells derived from seven people. They then exposed the muscle cells to one of two drugs that have been linked to heart problems in some people: rosiglitazone and tacrolimus. The results showed differences in how the cells responded to the drugs: one cell line, for example, showed signs of increased stress after treatment that were not observed in cells from other patients.

The approach could one day be used to tailor treatment regimens to individuals and to test drug candidates for potential toxicity before they enter clinical trials.

Cell Stem Cell <http://dx.doi.org/10.1016/j.stem.2016.07.006> (2016)

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