RESEARCH HIGHLIGHTS

Selections from the scientific literature

AGEING

Less cancer protein, longer life

Mice live longer — and seem to age more slowly — if they express lower levels of a cancer-promoting protein called MYC.

High levels of MYC favour tumour growth, but some expression of the protein is required for survival. John Sedivy of Brown University in Providence, Rhode Island, and his colleagues studied the effects of low MYC expression in mice. Mice with only one copy of the *Myc* gene lived 15% longer than those with two copies of the gene, although development and reproduction in the two groups were the same.

Mice with a single copy of *Myc* had a faster metabolism, and less severe age-related conditions such as osteoporosis or the thickening of the heart tissue.

Cell **http://doi.org/znb (2015)**

JORGE SAENZ/AP

HYDROLOGY

Dams reshape the world's rivers

Dams have altered 48% of all river flow worldwide. And if all dams planned for the next few decades are built, that proportion will nearly double.

Günther Grill of McGill University in Montreal, Canada, and his team developed two ways to analyse how dams break up and regulate river flow. They calculated how 6,374 existing dams and 3,377 proposed ones affected (or would affect) river volume worldwide between 1930 and 2030. The team found significant changes to existing water flow in rivers such as the Parana River in South America (pictured). The biggest future effects would arise from dams being planned for the Amazon basin.

The models could help engineers to reduce the environmental effects of new dams.

Environ. Res. Lett. 10, **015001 (2015)**

BIOMECHANICS

Bird's flight captured in a box

Researchers have measured the aerodynamic forces of a bird flying inside a box.

Until now, the aerodynamic lift achieved by free-flying animals has only been estimated using models. David Lentink of Stanford University in California and his team built an enclosed device to directly measure forces generated by a bird's wings during flight. With each flap, moving air exerts a force on the walls of the box, which is captured by sensors. The signals were synchronized with those from a high-speed camera, which records a bird's flight from one side of the enclosure to the other.

The researchers confirmed previous findings that each downstroke of a bird's wings generates enough force to lift twice the animal's body weight into the air. The device could be used with other animals and free-flying robots, says the team.

J. R. Soc. Interface 12, **20141283 (2015)**

CHEMISTRY

Sodium explosion caught on camera

Chemists have scrutinized a classic piece of bench chemistry — the explosion that happens when sodium metal hits water — and revised the thinking of how it works.

On contact with water, the metal produces sodium hydroxide, hydrogen and heat, which was thought to ignite the hydrogen and cause the explosion. To delve into this, Pavel Jungwirth at the Czech Academy of Sciences in Prague and his team used high-speed cameras to capture the reaction of a drop of a liquid alloy of sodium and potassium with water at room temperature.

They found that spikes of the metal shoot out from the droplet just 0.4 milliseconds after it enters the water — too fast to have been expelled by heat. Computer simulations revealed that sodium atoms at the surface of a small cluster each lose an electron within picoseconds. The positively charged ions rapidly repel each other, causing the explosion, while the protruding metal spikes generate new surface area that drives the reaction.

Nature Chem. **http://dx.doi.org/10.1038/nchem.2161 (2015)**

CLIMATE SCIENCE

Big swings in weather to come

Weather extremes could become more common as the climate warms this century, because extreme cooling events in the Pacific Ocean are predicted to occur more often.

La Niña events occur when the equatorial Pacific cools, causing droughts and floods

worldwide. Wenju Cai of the Commonwealth Scientific and Industrial Research Organization in Aspendale, Australia, and his colleagues analysed the occurrence of significant La Niñas and related El Niño events from 1900 to 2099, simulated under rising concentrations of greenhouse gases in the atmosphere. The researchers found that the number of extreme La Niña events increased from one every 23 years to one every 13 years in the twenty-first century.

Most of the severe La Niñas will follow severe El Niños, resulting in wide, annual swings between opposite extreme weather events, the authors suggest.

Nature Clim. Change **http://doi.org/zph (2015)**

PALAEOANTHROPOLOGY

Ancient hands built for tools

The hands of hominins that lived about 3 million years ago were capable of clutching tools.

The first tool-using hominin is widely believed to have been *Homo habilis* — known as the handyman — in part because its appearance in the fossil record 2.4 million years ago coincides with the earliest stone tools. To search for earlier signs of tool use, a team led by Matthew Skinner and Tracey Kivell at the University of Kent, UK, analysed the composition of the hand bones of *Australopithecus africanus* fossils from South Africa, which are between 2 million and 3 million years old. The ends of *A. africanus* metacarpal hand bones (**pictured**), which form the palm, resembled those of later toolmakers such as *Homo sapiens* and Neanderthals.

The team concludes that *A. africanus* could forcefully grip objects using an opposable thumb.

Science 347, **395–399 (2015)**

T. L. KIVELL

ECOLOGY

Pumas feel the fear near humans

Female pumas that live near human populations hunt more often but spend less time eating their prey than do those in less populated areas.

Humans can cause declines in wildlife populations, but their effect on animal behaviour is less well understood. Justine Smith and her colleagues at the University of California, Santa Cruz, tagged 30 pumas (*Puma concolor*) in California and tracked their movements in areas with four different densities of human housing. They found that at kill sites near the most densely populated areas, female pumas spent 42% less time consuming their prey than those in the least populated regions. To compensate, the females in the more developed habitats killed 36% more deer.

Fear of humans is probably driving this behavioural change, which could have further ecosystem effects, such as boosting scavenger populations and even compromising the reproductive health of female pumas, the authors speculate.

Proc. R. Soc. B 282, **20142711 (2015)**

ENVIRONMENTAL SCIENCE

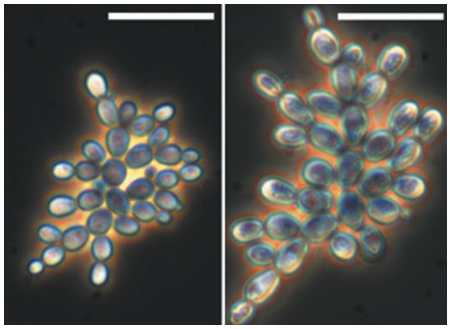
Methane escapes from major city

The ageing pipeline infrastructure of Boston, Massachusetts, is leaking natural gas — mostly methane, a potent greenhouse gas — at more than double the rate of previous estimates.

Atmospheric methane levels had plateaued but have been growing worldwide since 2007, for reasons that are unclear. Kathryn McKain at Harvard University in Cambridge, Massachusetts, and her colleagues monitored methane levels at four locations in Boston for a year. They also used a model of atmospheric processes to determine methane emissions. They found that 60–100% of the emitted methane was from the city's natural-gas system, and that the Boston region is losing about 2.7% of its natural gas: 2–3 times more than other estimates.

Cities that consume natural gas could be a bigger source of atmospheric methane than was previously thought.

Proc. Natl Acad. Sci. USA **http://doi.org/zpk (2015)**



W. RATCLIFF *ET AL.*, *NATURE COMMUN.*/CC BY

EVOLUTION

How yeast go multicellular

A genetic mutation in single-celled yeast turns it into a multicellular organism — hinting at how multicellularity might have evolved.

William Ratcliff at the Georgia Institute of Technology in Atlanta and his co-workers studied a strain of yeast (*Saccharomyces cerevisiae*) in which the daughter cells remain attached to the mother cells after dividing, resulting in multicellular 'snowflake' yeast. By mathematically modelling the way that clusters break off, the authors conclude that this way of growing makes the cells in each cluster genetically similar. This allows natural selection to act on the clusters rather than on individual cells, speeding up multicellular evolution. A mutation in a gene encoding the protein ACE2 causes the clusters to form.

After 60 days of selection (400 generations), the yeast evolved bigger cells (**pictured**, right; scale bars are 50 μm) compared with those at 14 days (left). The results show how a single mutation can create multicellular clusters and set the stage for the future evolution of organismal complexity.

Nature Commun. 6, **6102 (2015)**

SOCIAL SELECTION

Popular articles on social media

Celebrating beauty in science writing

Not many people read research articles for the snappy writing. But Stephen Heard, an ecologist at the University of New Brunswick in Fredericton, Canada, argues in a blogpost (go.nature.com/a2xh1m) that scientific writing could be more readable and even elegant, an observation that set off a widespread social-media reaction. Heard wrote that researchers should try livening up their scientific prose to attract and keep more readers. Isabelle Côté, a marine ecologist at Simon Fraser University in Burnaby, Canada, tweeted: "Let's put some whimsy, humour and beauty in scientific writing." Anthony Caravaggi, a conservation biologist at Queen's University Belfast, UK, tweeted: "I'd love to see less turgidity & more charm."

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