

GENOMICS

Tomato flavour genes mapped

Tastier tomatoes could be on the menu if breeders reintroduce lost gene variants involved in the production of flavour compounds.

Harry Klee at the University of Florida in Gainesville, Sanwen Huang at the Chinese Academy of Agricultural Sciences in Shenzhen and their team analysed the chemical composition and genetics of 398 tomato cultivars comprising old, modern and wild varieties. The modern ones produced fewer volatile chemicals that correlate with pleasant flavour. The researchers identified the gene variants needed to make these chemicals and found that many have been lost as breeders have selected for other traits, such as fruit size.

The findings could help breeders to improve the flavour of tomatoes with minimal reductions in yields, the authors say.

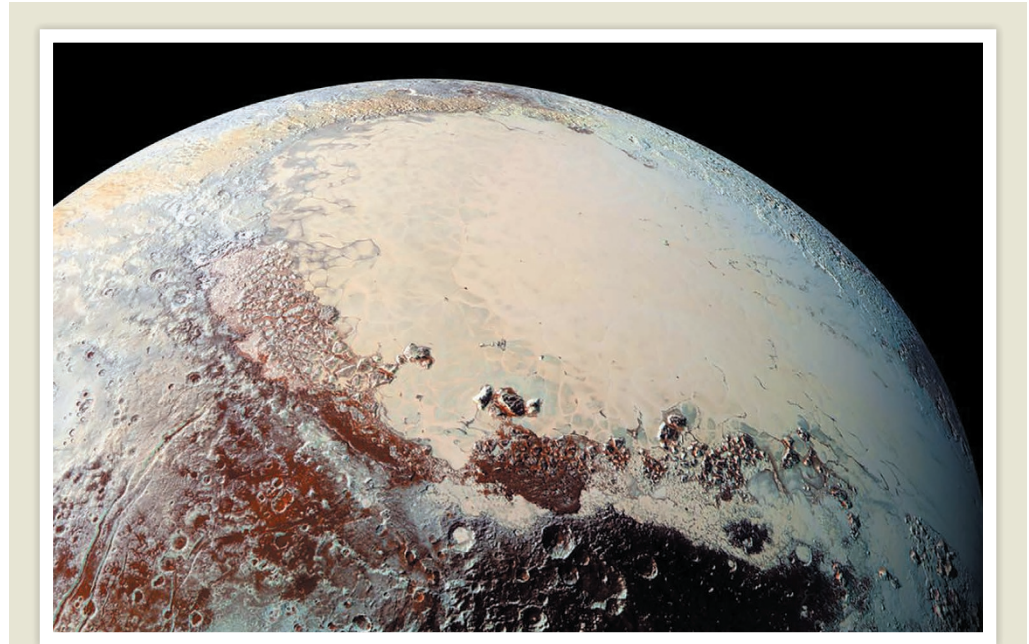
Science 355, 391–394 (2017)

CLIMATE CHANGE

Lasting heavy rains to come

The volume of rain produced by individual storms is projected to rise in the coming years thanks to global warming.

Rainfall is expected to become more intense in a warming world, but how the duration of discrete events might change has not been clear. David Neelin at the University of California, Los Angeles, and his colleagues used a global climate model and statistical theory to analyse how the upper limit of water accumulated in individual rainfall events



PLANETARY SCIENCE

Pluto's dark equator explained

The cosmic impact that formed Pluto's moon Charon several billion years ago may also have created the dark regions seen at Pluto's equator (pictured).

Scientists led by Yasuhito Sekine at the University of Tokyo ran laboratory experiments to see what might happen if a comet rich in organic compounds slammed into the proto-Pluto. Heat from the impact would have warmed liquid water, possibly allowing organic materials in pools of this

water to transform into chemically more complex, darker substances.

Simulations of the Charon-forming impact suggest that it could have heated vast areas in similar locations to those where the dark materials lie today. The work contradicts earlier studies that suggested that the dark material was delivered by comets, or formed over billions of years as solar radiation bombarded Pluto's surface.

Nature Astron. 1, 0031 (2017)

might change in a warming climate. They found that if temperatures rise by 3°C above preindustrial temperatures, the probability of the largest regional precipitation events observed in the past increases as much as tenfold in most regions.

By the end of the century, unprecedented accumulation of rain water could pose a challenge to societies' capacity to adapt to a shifting climate, the authors say.

Proc. Natl Acad. Sci. USA
<http://doi.org/bxwp> (2017)

MICROBIOLOGY

Salmonella makes hosts eat

Salmonella bacteria can inhibit the loss of appetite that often accompanies bacterial infection, probably to boost the microbe's spread to new hosts.

Janelle Ayres and her team at the Salk Institute for Biological Studies in La Jolla, California, fed mice that had previously been

kept pathogen-free with strains of *Salmonella enterica* serovar Typhimurium (*S. Typhimurium*; pictured). They found that a protein secreted by *S. Typhimurium* during infection, called SlrP, blocks molecular signalling between the gut and the brain by interfering with inflammatory processes. As a result, although the



ANDREW FORBES

infected animals ate less than normal, the decrease in their food intake was less marked than in mice infected with a mutant strain that lacked this protein. Fewer of the animals carrying the mutant bacteria shed it in their faeces, even though the bacteria had spread throughout the body more often than in mice infected with normal *S. Typhimurium*.

Limiting appetite loss is advantageous for both *S. Typhimurium* transmission and host survival, the authors say. *Cell* 168, 503–516 (2017)

MATERIALS

Metal–organic mix for air filters

Air filters that greatly reduce air pollution could be mass-produced using materials called metal–organic frameworks (MOFs).

MOFs are porous crystalline materials containing organic ‘struts’ and metal ions, and can capture large amounts of fine particulate matter electrostatically. Bo Wang and his colleagues at the Beijing Institute of Technology heated three kinds of MOF crystals and applied them individually to substrates including fabric, foam and plastic using two hot rollers. In lab tests, the resulting filters reduced the levels of hazardous 2.5- and 10-micrometre-wide particles in air by up to 99.5% at room temperature, with a loss of efficiency of only a few per cent at 200 °C.

Potential applications for the filters include household vacuum-cleaner dust bags and vehicle exhaust pipes.

Adv. Mater. <http://doi.org/f3tx3v> (2017)

DEVELOPMENTAL BIOLOGY

Human–pig embryo made

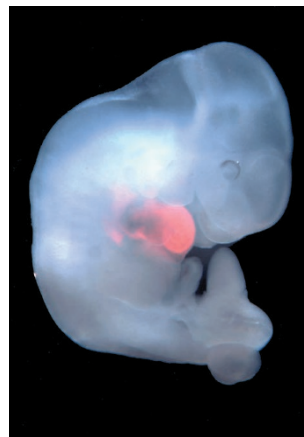
Human stem cells can integrate into developing pig embryos, a finding that could lead to new ways of growing human organs and studying

early human development.

Previous attempts to engraft human stem cells into developing mice have met with limited success. Juan Carlos Izpisua Belmonte at the Salk Institute for Biological Studies in La Jolla, California, and his colleagues instead worked with embryos of pigs, which are biologically more similar to humans. They injected various types of human pluripotent stem cell — which can develop into any cell type — into balls of cells called blastocysts that become embryos. Early-stage human pluripotent stem cells integrated into the blastocysts, but only stem cells injected at an intermediate stage of maturity went on to form later-stage embryonic chimaeras, which contained appreciable numbers of cells from both species.

The researchers also grew rat stem cells (pictured in red) into organs in mouse embryos by eliminating the development of certain mouse organs — a technique that could be applied to human–pig chimaeras to generate human organs in the future.

Cell 168, 473–486 (2017)



NEUROSCIENCE

How to separate memories cleanly

The harrowing flashbacks experienced by people with post-traumatic stress disorder when recalling a memory of normal daily life are an example of what can happen

when two memories become linked. By targeting specific brain cells, researchers have separated memories in mice without affecting how each memory is recalled individually.

Kaoru Inokuchi at the University of Toyama in Japan and his colleagues gave mice a mildly harmful chemical along with a sweetener, and then administered electric shocks at the same time as the animal heard a sound. The authors then gave the sweetener and made the sound at the same time to link the two memories. A specific group of neurons in the brain’s amygdala stored this memory link. Suppressing the activity of these brain cells unlinked the memories, but the mice were still able to recall the individual memories.

The results suggest that a therapy targeting these brain cells could one day help people with post-traumatic stress disorder.

Science 355, 398–403 (2017)

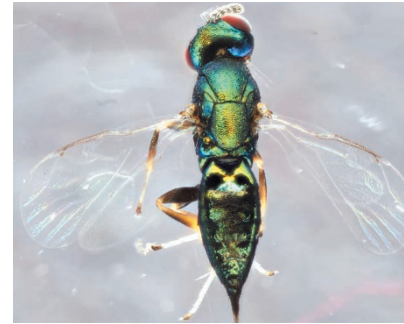
ECOLOGY

Parasite controls another wasp

A newly discovered wasp can increase its own chance of survival by infecting another parasitic wasp and controlling its mind.

The crypt gall wasp (*Bassetia pallida*) causes trees to produce abnormal growths, or galls, which provide a protected place for their eggs. Newly developed adult wasps gnaw their way out, but some die with their head blocking the escape hole.

To find out why, Kelly Weinersmith at Rice University in Houston, Texas, and her team collected crypt galls, and found that nearly all head-plugging wasps were infected with a previously undescribed species of wasp, the crypt-keeper (*Euderus set*, pictured). The team resealed some head-plugged holes, and found that *E. set* adults were three times more likely to die trapped in these galls than in those in which they only had



to emerge through *B. pallida* heads. This suggests that *E. set* is manipulating the behaviour of its host, causing *B. pallida* to dig the hole in the crypt and plug it with its head, allowing *E. set* to escape easily, the authors say.

Proc. R. Soc. B 284, 20162365 (2017)

CLIMATE CHANGE

Drop in coal use slows emissions

The growth of global carbon emissions has slowed in recent years, primarily because coal use in China and the United States has fallen since 2011 as a result of broad economic trends, greater energy efficiency and the expansion of renewable energies.

Glen Peters at the Center for International Climate and Environmental Research–Oslo and his co-workers developed a way to track progress on emissions pledges made under the 2015 Paris Agreement, using national and global data on energy, emissions and economic trends. They estimate that carbon emissions remained flat in 2016.

Despite the recent slowdown, the authors warn that it will be difficult to limit global warming to 2 °C above pre-industrial levels without large-scale deployment of technologies such as carbon capture and sequestration.

Nature Clim. Change <http://dx.doi.org/10.1038/nclimate3202> (2017)

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