

RESEARCH HIGHLIGHTS

Selections from the scientific literature

CLIMATE SCIENCES

Economic link to global warming

Changes in the rate of global warming can be pinned to specific episodes in human history.

In a statistical analysis, a team led by Francisco Estrada of the National Autonomous University of Mexico in Mexico City looked at global mean temperatures since 1880, as well as greenhouse-gas levels and other factors that warm or cool the planet. The authors found that economic slowdowns during the two world wars and in the Great Depression temporarily slowed the planet's warming.

The analysis also suggests that the Montreal Protocol, which phased out chemicals that deplete the ozone layer and trap heat, has helped to slow warming in recent decades.

Nature Geosci. <http://doi.org/p2b> (2013)

For a longer story on this research, see go.nature.com/g93gb6

ARCHAEOLOGY

Burials indicate Viking sacrifices

Vikings may have sacrificed slaves to be buried with their masters.

In the 1980s, archaeologists working on the Norwegian island of Flakstad discovered and excavated ten individuals from six burials dating to between AD 550 and AD 1030. Remains from three multiple burials all contained at least



one skeleton lacking its skull.

To establish the relationship between them, a team led by Elise Naumann of the University of Oslo analysed mitochondrial DNA (which is inherited from the mother) as well as nitrogen and carbon isotopes from various parts of the skeletons (including a tooth; **pictured**).

The results suggested that individuals in the multiple burials did not share maternal ancestry, and that individuals found without skulls generally ate less meat than intact individuals in the same graves. The differences in ancestry and diet imply that the beheaded individuals might have been slaves, as has been suggested for other double burials from the Norse world. *J. Archaeol. Sci.* 41, 533–540 (2013)



PHYSICS

Traffic jams follow the laws of physics

Traffic congestion closely resembles the physics of phase transitions, such as when ice melts or a metal becomes superconducting.

Shin-ichi Tadaki at Saga University in Japan and his colleagues used a high-resolution laser scanner to track cars travelling around an empty indoor baseball stadium, then analysed those

data as if they were studying phase transitions in a material. They found that above a critical density of cars, traffic flow became unstable and changed from free-flowing to a jam.

Scaled up, that density value fits with those seen on real-world motorways, the authors say. *New J. Phys.* 15, 103034 (2013)

CANCER

Breast-cancer mutations found

Mutations in the gene encoding the oestrogen receptor (ER) have been identified in aggressive breast tumours.

About 70% of breast cancers express the ER, which helps to propel rampant growth. Several drugs target the effects of the sex hormone on its receptor, but tumours often develop resistance to such treatment.

Independent teams led by Sarat Chandralapaty at the Memorial Sloan-Kettering Cancer Center in New York, Arul Chinnaiyan at the University of Michigan in Ann Arbor and Ido Wolf at the Tel Aviv Sourasky Medical Center

in Israel, sequenced tumours from a total of 104 patients with metastatic breast cancer and found ER mutations in 25. Further work indicated that these mutations could keep the receptor active even in the absence of oestrogen.

Drugs that inhibit the receptor in other ways might stall aggressive tumours, the researchers say. *Nature Genet.* <http://doi.org/pxp>; <http://doi.org/pxq> (2013) *Cancer Res.* <http://dx.doi.org/10.1158/0008-5472.can-13-1197> (2013)

CRYPTOGRAPHY

Keeping quantum secrets

Quantum cryptographers have used devices in Switzerland and Singapore to deliver a

AKIHIRO NAKAYAMA

ELISE NAUMANN

secret message in the form of a committed bit — the value of which is kept hidden until a designated time.

Bit commitment is potentially useful for voting and other applications in which privacy is key, but ultra-secure quantum commitment schemes have proved difficult to implement.

Felix Bussi eres of the University of Geneva in Switzerland and his colleagues experimentally demonstrated a protocol proposed in 2012 for keeping committed bits secret. The technique, which relies on the constancy of the speed of light, can prevent insecure communication between remote locations for periods of up to 15 milliseconds, perhaps long enough to enable high-speed stock trading.

Phys. Rev. Lett. 111, 180504 (2013)

REGENERATIVE MEDICINE

Embryo protein has healing power

A protein that is present mainly in developing embryos gives some adult tissues an exceptional ability to heal.

The protein Lin28a controls growth and development in animals from worms to humans, but it is rarely found in adult tissues in vertebrates.

When researchers led by George Daley at Boston Children's Hospital in Massachusetts engineered mice so that the protein was produced into adulthood, the animals' hair grew faster and puncture wounds in their ears healed more thoroughly. Newborn animals were more likely to regrow the tips of severed digits.

Lin28a represses an anti-growth regulatory program and boosts the production of many metabolic enzymes. In doing so, the researchers say, the protein induces a state that enhances tissue repair. *Cell* 155, 778–792 (2013) For a longer story on this research, see go.nature.com/8cejq3

INFLAMMATORY DISEASE

Sun synchronizes immune system

Daily light cycles help to set animals' response to infection.

Lora Hooper of the University of Texas Southwestern Medical Center in Dallas and her colleagues showed that a protein that controls whether certain white blood cells mature is in turn controlled by proteins that set daily rhythms. When mice were exposed to abnormal light cycles, rhythm-setting proteins sent signals to the immune system, prompting it to make more inflammatory cells in the gut.

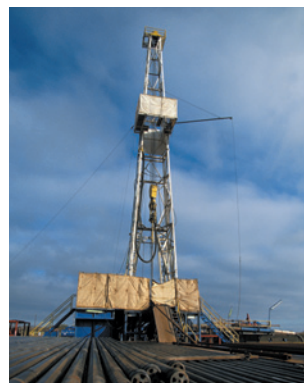
Inflammation protected the mice against bacterial infection, but it also made them more susceptible to inflammatory bowel disease and colitis. The findings might explain why shift workers and others with disrupted sleep cycles are more prone to immune disorders. *Science* 342, 727–730 (2013)

SEISMOLOGY

Injected gas makes Earth rumble

Earthquakes that shook an old Texas oil field over the past few years could be due to injections of carbon dioxide gas. Previous tremors in the area were tied to wastewater injections, but these are the first events attributed to forcing pressurized gas underground.

Two years after significant gas injections began in the oil field to boost production



COMMUNITY CHOICE

The most viewed papers in science

VIROLOGY

New flu virus found in bats

HIGHLY READ
on plos.org in the past 30 days

The flat-faced fruit bat (*Artibeus planirostris*; pictured) in Peru carries a flu virus that was previously unknown to science.

H18N11 is the second influenza A virus to be identified in bats, and both were found by a team led by Ruben Donis of the Centers for Disease Control and Prevention in Atlanta, Georgia. The team found huge genetic diversity in bat influenza A viruses: four of eight bat viral gene segments harboured more genetic variation than did corresponding viral segments in other mammals and birds combined.



Blood analyses also revealed that H18N11 infects several bat species.

Neither of the bat viruses has been found in humans, but the discoveries suggest that bats are a reservoir for diverse flu viruses that could fuel new infections.

PLoS Pathog. 9, e1003657 (2013)

(pictured), the area experienced a spate of small earthquakes, 18 of which reached magnitudes between 3 and 4.4. Wei Gan and Cliff Frohlich at the University of Texas at Austin have now determined the precise location and timing of the quakes.

The locations correlate with gas injection sites and suggest that slippage occurred along a previously unidentified fault. Nearby fields where gas was also injected did not show such seismic activity, however, and the researchers say that more data are needed to predict where gas injection could trigger tremors.

Proc. Natl Acad. Sci. USA <http://doi.org/pxs> (2013)

For a longer story on this research, see go.nature.com/x4hnn4

MEDICAL MICROBIOLOGY

Gut microbes linked to arthritis

Unfriendly bacteria in the gut might bring on inflammation in the joints.

Dan Littman at the New York University School of

Medicine and his colleagues collected stool samples from people with arthritis. Sequencing experiments on gut bacteria showed that individuals with newly diagnosed arthritis were more likely to harbour the bacterium *Prevotella copri* than were individuals without the condition.

High levels of *P. copri* and related species correlated with low levels of beneficial microbes that are thought to suppress the immune system and metabolize vitamins into forms that are absorbed by the bloodstream. When inoculated with *P. copri*, mice became more sensitive to colitis, and the levels of beneficial microbes in their guts dropped.

Gut bacteria have long been implicated in arthritis, but this is the first time that researchers have correlated the onset of human disease with a particular microbial species. *eLife* 2, e01202 (2013)

NATURE.COM

For the latest research published by Nature visit:

www.nature.com/latestresearch