

W. T. FITCH ET AL.

should aid in the design of better additives, which could reduce the high cost of keeping vaccines cold to maintain their potency during distribution. *Nature Commun.* 7, 13520 (2016)

## MATERIALS

## Graphene putty feels the beat

A dash of graphene can transform the stretchy material known as Silly Putty into a pressure sensor that can monitor a human pulse and even the steps of a small spider.

Jonathan Coleman at Trinity College Dublin and his colleagues mixed graphene flakes — consisting of roughly 20 layers of carbon atoms, and measuring up to 800 nanometres in length — with homemade Silly Putty, a cross-linked silicone polymer. This produced a material, dubbed G-putty, that conducted electricity. Its resistance changed markedly when the authors applied the slightest pressure, making it more than ten times more sensitive than typical pressure sensors.

The team used G-putty to take accurate blood-pressure measurements and record the steps of a 20-milligram spider. *Science* 354, 1257–1260 (2016)

## ANIMAL BEHAVIOUR

## Ants 'talk' by swapping spit

Oral fluid exchanged between ants contains molecules that the insects might use to communicate.

Ants were generally thought to share only nutrients and enzymes through a mouth-to-mouth feeding process called trophallaxis. But when Adria LeBoeuf at the University of Lausanne in Switzerland and her co-workers analysed the oral liquid of the species *Camponotus floridanus*, they found 64 microRNAs, 49 long-chained hydrocarbons, a hormone that regulates growth and more than 50 proteins

involved in development, digestion and immunity.

The hydrocarbons could contribute to a characteristic colony odour, and the hormone may influence larval growth and development. When the team added the hormone to the food of worker ants, more than twice as many of the larvae they reared reached adulthood, compared with those that were not exposed. The findings suggest that trophallaxis facilitates communication and helps the colony to develop, the authors say.

*eLife* 5, e20375 (2016)

## ASTRONOMY

## Gaia charts one billion stars

The positions of more than one billion stars in our Galaxy have been mapped with unprecedented precision by the European Space Agency's Gaia satellite (artist's impression **pictured**).

The craft launched in 2013 with the aim of making the most detailed ever 3D map of a portion of the Milky Way — including distances to stars from Earth, which are difficult to measure. Lennart Lindegren at Lund University in Sweden and his colleagues processed the first version of the data set, whose uncertainties are one-third of the size of those from the satellite's predecessor, Hipparcos. The catalogue currently includes some two million measurements of parallax — a star's apparent shift in position in the sky as Earth orbits the Sun — which allows scientists to determine the star's distance from Earth.

The catalogue should eventually allow researchers

to improve on estimates of the locations of most distant galaxies and the expansion of the Universe, which are measured relative to distances between nearer objects.

*Astron. Astrophys.* 595, A4 (2016)

## SYNTHETIC BIOLOGY

## Designer cells treat diabetic mice

Kidney cells grown in the lab have been engineered to both sense and quickly respond to changes in blood glucose levels.

In diabetes, cells in the pancreas called  $\beta$  cells are either absent or do not produce the correct amount of insulin to regulate blood glucose levels. Jörg Stelling and Martin Fussenegger at the Swiss Federal Institute of Technology Zurich in Basel and their colleagues genetically modified human kidney cells to enable the cells to detect blood glucose levels and produce an appropriate amount of either insulin or another hormone called GLP-1, which stimulates insulin production. The cells brought blood sugar levels down to normal when implanted into mice with type 1 or type 2 diabetes, without notable adverse effects.

In mice with type 1 diabetes, the 'designer' cells were more efficient at restoring normal glucose levels after a three-week period than implanted  $\beta$  cells.

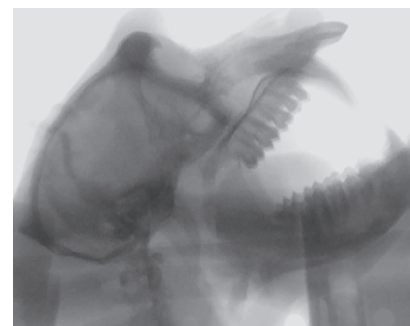
*Science* 354, 1296–1301 (2016)

## PRIMATOLOGY

## Macaques vocally equipped to speak

Monkeys could talk, if they only had the right brain circuitry.

An influential 1969 paper examined the cadaver of a rhesus macaque (*Macaca mulatta*) and concluded that its vocal anatomy was not capable of speech. To reassess this claim, a team led by Tecumseh Fitch at the University of Vienna and Asif Ghazanfar at Princeton University in New Jersey



X-rayed live long-tailed macaques (*Macaca fascicularis*, **pictured**) as they made various sounds, such as threat calls.

Using the scans, the authors developed a computer model of the macaque vocal tract. This suggested that the monkeys do have the anatomy to make speech sounds, including five vowels and even the phrase "Will you marry me?"

Monkeys can't speak because they lack the brain circuitry required for fine motor control, vocal learning and other attributes necessary for speech, the authors say.

*Sci. Adv.* 2, e1600723 (2016)

## ECOLOGY

## Extinctions on the warm front

Hundreds of species are not adapting quickly enough to cope with global warming, and are disappearing from local areas in the warmest parts of their ranges.

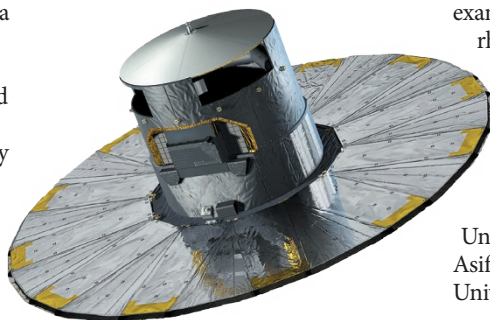
John Wiens at the University of Arizona in Tucson analysed 27 studies on 976 species, many of which have shifted their range in response to climate change. In almost half, populations have disappeared from the hottest edges of their ranges as the global climate has warmed. These local extinctions were more common in the tropics and subtropics than in other climates, in fresh water than in the sea or on land, and in animals than in plants.

*PLoS Biol.* 14, e2001104 (2016)

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