

# News

## Asteroid strike, not volcanoes, spelt the end for the dinosaurs



Peter Arnold Images/PhotoLibrary.com

THE EXTINCTION of the dinosaurs and half of all species on Earth was caused by a 15km-wide asteroid slamming into the planet and not by massive volcanic eruptions.

A panel of 41 international experts came to this conclusion after reviewing 30 years' worth of data on the subject. Their results are published in *Science*.

The so-called Cretaceous-Tertiary (K-T) mass extinction

event, which happened around 65 million years ago, wiped out dinosaurs, bird-like pterosaurs, large marine reptiles and two-thirds of all species on Earth, ultimately paving the way for mammals to rise to dominance.

Scientists first suggested 30 years ago that an asteroid was behind the mass extinction, after discovering chemical elements originating from meteorites in rocks dating from the transition between the

Cretaceous and Tertiary, sampled all over the world. This idea got further support when researchers then found a 200km-wide impact crater at Chicxulub in Mexico's Yucatán Peninsula.

The asteroid is believed to have hit the Earth with a force a billion times more powerful than the atom bomb at Hiroshima – enough to blast material into the atmosphere at several kilometres a second and spread dust all over

the world. 'The impact would have had catastrophic effects including extended darkness, global cooling, acid rain and massive earthquakes,' says Dr Peter Schulte from the University of Erlangen in Germany, lead author of the study.

Even so, some scientists argue that volcanic activity in India, which lasted around 1.5 million years, was the cause. These eruptions spewed around 1.1 million square kilometres of basalt lava across the Deccan Traps, which would have cooled the atmosphere and caused severe acid rain, spelling the end for much of life on Earth at the time.

To get to the bottom of the conundrum, the scientists sifted through a wealth of information that palaeontologists, geochemists, climate modellers, geophysicists and sedimentologists have built up surrounding the K-T extinction over the last 30 years. The most compelling piece of evidence to support the asteroid theory was an abundance of iridium in geological samples from around the world, deposited at the exact time of the extinction. Iridium is rare in the Earth's crust, but common in asteroids.

Not only this, but more than 350 samples from the K-T boundary from around the world show a distinctive distribution pattern, with the amount of ejected material related to the distance from the Chicxulub crater at which the sample was taken.

'It is clear that our paper does not bring discussions to an end, but we made a very strong case built on many scientific disciplines for the Chicxulub impact as the ultimate cause for the K-T mass extinction,' says Schulte.

## Bowerbirds copy calls from other species, not neighbours

BOWERBIRDS are better known for their elaborate mating arenas, but they are also accomplished vocal mimics. Now scientists have discovered that they learn their repertoire directly from other bird species, not from their bowerbird neighbours.

Little is known about why bowerbirds mimic other calls or how they learn and expand their vocal repertoire. 'Do they learn sounds from other bowerbirds or do they learn them directly from the species being mimicked?' wondered Laura Kelley, a biologist based at the University of Edinburgh.

As part of her PhD project, Kelley travelled to Queensland in Australia to record the sounds produced by male spotted bowerbirds living in the Taunton National Park. She visited the territories of 19 male bowerbirds and recorded their calls together

with noises from the surrounding area. Back in the lab, Kelley identified which species they were trying to copy. She also analysed each call's spectrogram – 'the visual representation of a sound'.

Although the bowerbird's own call is an unimpressive hissing sound, the examples Kelley analysed were able to mimic 14 different species of bird, including raptors and songbirds. The bowerbirds' mimetic portfolio varied across the park. Males were more likely to share the content of their repertoire with neighbours than with other bowerbirds located further afield. 'This suggests that the birds are copying the sounds of their local environment,' says Kelley, who published the results in *Biology Letters*.

The bowerbirds' interpretation of the pied butcherbird call is a good example. Each individual copied the butcherbirds' call in a slightly different way. 'Since



Michael Fogden/OSF

butcherbirds have small territories, it seems likely that each bowerbird mimicked the call of a local butcherbird,' suggests Kelley. On the other hand, bowerbirds across the park produced a fairly similar rendition of the whistling kite. This is probably because kites have large territories and their call

is likely to be heard by many different bowerbirds.

But we still don't know whether the birds are copying calls to ward off predators or potential rivals, or perhaps to attract females. 'We still need to know how bowerbirds use this mimicry,' Kelley explains.

## Bees brave British winters

BUMBLEBEES can now be seen all year round, especially in southern England where winter-flowering, non-native plants in urban gardens provide the food they need to survive the cold British winter.

Bumblebee colonies in Britain collapse at the end of the summer, when the old queen dies and her daughters go into hibernation before starting their own nests in the spring. But

since the 1990s, there is increasing evidence of a second generation of bees active during winter.

There could be several reasons. 'Warmer winters are an important factor,' says Dr Thomas Ings, an ecologist from Queen Mary, University of London. 'But the availability of food throughout the winter, in the form of exotic, winter-flowering plants in gardens, is crucial.'

To see whether the bees were getting enough food, Ings and his colleague Ralph Stelzer set up several colonies on the roof of their department at Queen Mary. They used automatic

radio-frequency identification (RFID) technology to tag individual bees and monitor their comings and goings around the colony. They also weighed each bee before and after foraging trips to see how much pollen and nectar they were collecting. 'We found that the bees were coming back with a good load of nectar in a short time,' says Ings. Evidently there is enough winter food to keep a healthy bumblebee colony going.

Very few native plants flower during winter, so where are the bees getting their nectar and pollen from? To find out, Ings' colleague Marc Carlton paid weekly visits to Kew Gardens, where he spotted bumblebees feeding on imported evergreen shrubs such as the

popular mahonia and other winter-flowering plants like strawberry trees or honeysuckles.

Ings says: 'Winter active bumblebee colonies are widespread in southern England, but activity is restricted to urban areas where there are plenty of exotic flowering plants in parks and our gardens.'

Another possible explanation for surging bee activity during winters may be interbreeding between local bumblebees and other subspecies, imported from warmer climates to pollinate tomato and strawberry crops. Some Mediterranean bumblebees are known to produce active colonies during the winter, and they may be passing this ability on to their British cousins.



# News

## Volcanic ash cloud hits UK



WHEN the plume of ash spewing from Iceland's Eyjafjallajökull volcano brought Europe's aviation industry to a halt in April, NERC scientists, pilots and technicians swung into action.

The BAe-146 atmospheric research aircraft that NERC maintains alongside the Met Office via the Facility for Airborne Atmospheric Measurements was grounded for a refit, but the necessary instruments were quickly moved onto NERC's other research aircraft, the Dornier 228 operated by the Airborne Research & Survey Facility out of Gloucester airport.

The Dornier, which is normally used for remote sensing work at comparatively low altitudes, was swiftly airborne and flying out to the plume's expected location.

Over the next few days it made repeated flights around the plume to gather information on where it was and how it was behaving, while using its sophisticated sensors to keep itself out of danger.

Meanwhile technicians worked round the clock to bring the BAe-146 out of refit to help with the task. This is bigger and better-suited to high-altitude research flights than the Dornier; once it could fly again, researchers used both aircraft to probe the ash plume simultaneously from above and below.

This information provided vital support for government and aviation industry decisions about reopening UK airspace.

Meanwhile, researchers at the National Centre for Atmospheric Science provided guidance and advice on the plume's likely movement and effects.

This image shows the plume over the UK on 15 April. It was taken by NASA's Terra satellite and prepared from data received at the NERC-funded Satellite Receiving Station in Dundee.

## Malaria parasites resist drugs by changing lifecycle

MALARIA parasites that are sensitive to anti-malarial drugs could evolve and cause more serious illness in people who don't get treated with drugs, researchers have discovered.

Scientists found that stressing drug-sensitive *Plasmodium falciparum* parasites by exposing them to low levels of anti-malarial drugs makes them change their behaviour. Rather than putting their energy into developing specialised forms, which can be transmitted to other people by mosquitoes, the parasites replicate within their existing hosts.

'It's this replication stage of the parasite's lifecycle that causes the classic fever and chills symptoms of malaria,' explains Dr Sarah Reece from the University of Edinburgh, who led the research.

Her team think this change in behaviour is the parasite's attempt to improve its overall chances of survival. It takes more energy to develop the specialised transmission form of the parasite needed to spread the disease, so sticking to a simple replication – 'safety in numbers' – approach to survival is likely to serve the parasite well.

All creatures have to decide how to spend their limited energy

resources; both survival and reproduction are important if you want to spread your genes. Malaria parasites have to find the right balance of replicating and transmissible forms to make sure that they not only survive within their current hosts, but can also spread to new ones.

The new study, published in *Proceedings of the Royal Society B*, shows for the first time that exposing drug-sensitive strains of the human malaria parasite to low doses of anti-malarial drugs upsets that balance. 'We think that parasites sensitive to drugs invest in their survival and future transmission by diverting resources from reproduction to replication when exposed to drugs,' says Reece.

'It may be that the parasites aren't responding directly to drugs, but are adjusting their reproduction in response to changes in their numbers. There's some evidence to suggest the parasite counts to ensure there's an optimum number within a host,' she adds.

The findings will have implications for understanding and predicting the spread of anti-malarial drug resistance, and the researchers hope this will help inform disease-control strategies.



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## Unreliable diet makes young guppies bolder

YOUNG guppies with an Oliver Twist lifestyle grow into intrepid adults. Researchers have found that fish fed at random intervals are bolder and more inquisitive than those reared with a predictable supply of food.

Because 'guppies reared in unpredictable environments cannot rely on regular food supplies,' says Dr Ben Chapman, a behavioural ecologist from the University of Leeds, 'they benefit more from taking risks and actively seek foraging opportunities.'

Chapman wanted to find out why some guppies are bolder than others. 'There are two main explanations, not mutually exclusive – you either have bold genes, or the behaviour is shaped by the environment,' he explains. He and his colleagues investigated the role of early experience in the development of boldness in guppies, which live in rivers teeming with dangerous predators on the Caribbean island of Trinidad.

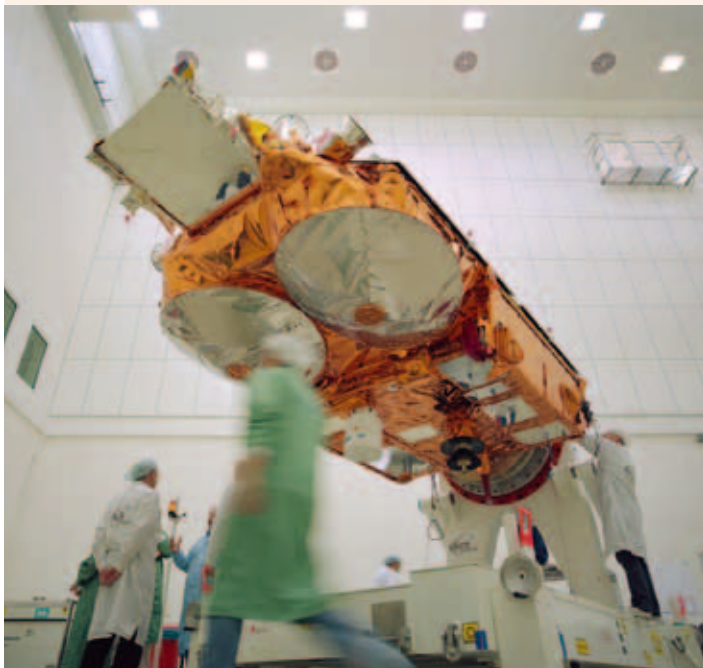
The team reared two groups of the fish. One was fed at the

same time each day; the other was given food at random times. When the fish were 56 days old, the team tested their behaviour in three experiments, described in *Behavioural Ecology*. The guppies raised with an unpredictable food supply were more likely to explore a fish tank set up as a maze and spent less time taking refuge. They also spent less time with shoal mates; as shoaling fish find safety in numbers the amount of time spent out of the group can be used as a measure of an individual's willingness to take risks.

A third experiment revealed that, while they might be bold, the guppies were not suicidal. A bird-shaped model was used to create the threat of a lurking predator over the fish tank. 'This provoked a very powerful response,' says Chapman. 'The guppies immediately froze, waiting for the danger to go away.' This time, however, there was no difference between the two groups. While some of the fish are more motivated to take risks, 'their main imperative is still to survive,' says Chapman.

# News

## Successful launch for ESA's CryoSat-2 ice mission



IN APRIL the European Space Agency launched its ice mission CryoSat-2 from the Baikonur cosmodrome in Kazakhstan. The long-awaited satellite will measure both the shape and thickness of polar ice with unprecedented accuracy.

The poles are warming up faster than any other region on Earth. Arctic sea ice is both thinning and receding, Antarctic ice sheets are either disintegrating or at risk of collapse and glaciers are retreating. But scientists don't yet know how melting polar ice affects ocean circulation patterns, sea level and the global climate. CryoSat-2's mission has been designed to help them answer these questions.

The aim is to measure the freeboard – the part of the ice that sits above the waterline. The satellite will use an altimeter to fire pulses of microwave energy down at the ice and record how long it takes for the pulses to return. Scientists will be able to calculate how thick the ice is to the nearest centimetre, by measuring the difference between the time it takes for the echoes to return from the top of ice floes and from the water in cracks in the ice.

Launch day was tense, not least for CryoSat-2's chief scientist, Professor Duncan Wingham from the Centre for Polar Observation and Modelling at University College London. He first proposed the satellite in 1999, but CryoSat-1 crashed into the northern Arctic Ocean just after lift-off. He immediately set to work persuading ESA that the mission was worthwhile enough to try again, and within four months plans were in place for CryoSat-2. 'We're exceptionally proud of this achievement,' he says.

CryoSat-2's ability to monitor changes at the poles will surpass the abilities of earlier ESA satellites – its radar has been specifically designed for the task and its orbit will cover much more of the Arctic and Antarctica than has previously been possible.

## Herbicides are not always the best solution

WHEN it comes to controlling the aggressive creeping thistle, careful grazing management is more effective than herbicides, say scientists from the Centre for Ecology & Hydrology (CEH).

The creeping thistle (*Cirsium arvense*) is a tall, fast-growing weed native to Britain and northern European grasslands which, if left unchecked, can smother other grass species and hinder grazing. Although it's part of the British flora (and should not be confused with the spear thistle, Scotland's national flower) the creeping thistle has spread dramatically and is now considered a problem in rural grasslands managed for nature conservation.

The reason behind this spike of thistle growth is probably the recent move to less intensive grassland management, which reduces the amount of fertilisers used and lowers grazing density. This is good for the ecosystem as a whole but it gives the creeping thistle a perfect environment to spread.

'Until now people thought that the only way to control it was to use herbicides,' says Professor James Bullock, an ecologist based at the CEH in Wallingford. But increasing the use of herbicides is not ideal. So in 2000 Bullock and CEH colleagues at North Wyke Research began to test different control methods at two sites – a lowland pasture in Buckinghamshire grazed by sheep and cattle, and upland grassland in Powys mostly occupied by sheep.

The treatments varied from plot to plot and included different intensities

of grazing, together with the use of herbicides, mowing or combinations of both. 'We found that, as expected, herbicides did decrease the abundance of the weed and that cutting had little effect,' says Bullock.

But the most important control method turned out to be the level of grazing. Bullock explains: 'The largest declines were observed in areas with lenient grazing in spring or autumn,' that is, plots where animals grazed lightly and the grass was maintained at a moderately tall height. High grass means trouble for the thistle because its yearly shoots won't grow as well if they're shaded by other plants. In contrast, where cattle and sheep grazed more heavily the grass is short and the creeping thistle is able to colonise the relatively open areas.

'Lenient grazing controls the creeping thistle as much as herbicides, with the advantage of being a long-term and environmentally-sustainable solution,' adds Bullock. 'We show that making the ecosystem less friendly to the weeds can be just as efficient [as chemicals] in the long run.'





## X-rays reveal ancient roach's secret life



PALAEONTOLOGISTS have scanned a 310-million-year-old cockroach fossil with the same X-ray technology used in hospitals to search for tumours, and discovered some intimate details about these ancient creepy crawlies.

*Archimylacris eggintoni* was 3cm long and lived 310 million years ago in what is now the Midlands, at a time when this region was near the Equator and covered by tropical rainforest. 'It's an ancestor of modern cockroaches and praying mantises that lived before the split of the two groups,' explains Russell Garwood, a palaeontology PhD student based at Imperial College London.

The fossil is embedded in

hard lumps of iron carbonate. 'The only thing we knew about it was what the creature looked like from above,' Garwood says.

Garwood is no stranger to this kind of problem: back in August 2009 he uncovered minute details of ancient spider-like creatures, using the Natural History Museum's CT-scanner to build a 3D image of the fossils. Now he has applied the same principle to the roaches. The X-rays revealed precious details about the wings, mandibles, legs and the antennae that 'were never seen before in fossil roaches from this age,' says Garwood.

*Archimylacris eggintoni* probably ate decaying matter, perhaps dead leaves lying around the forest floor. With one of its antennae parallel to the body and the other at a high

angle, it could probably sweep them in arc-like movements like modern cockroaches do.

Its legs were long and thin and were articulated in five different places near the end. This provided extra speed and allowed the roach to run very fast over irregular terrain. It also had claws that would probably have helped it climb trees to lay its eggs or escape from predators.

Thanks to the use of X-ray technology 'this is now one of the best known roach fossils from this age and we can make educated guesses about how it lived,' says Garwood. Knowing a prehistoric cockroach had claws and could travel at speed might be a bit too much detail for some.

### In brief

#### Marine effects of volcanic ash

Scientists from the National Oceanography Centre in Southampton led an expedition to the North Atlantic in May, on board RRS *Discovery*, to investigate the effects of the recent volcanic eruptions on the biology of the seas around Iceland. The North Atlantic is thought to be lacking in iron, an important nutrient for microscopic phytoplankton which absorb carbon dioxide from the atmosphere. The team hopes to reveal whether the volcanic ash has supplied extra iron to the area, which could have important consequences for the carbon cycle.

#### Going against the flow

Powerful and potentially deadly seaward-flowing rip currents are a major hazard to bathers. Under a new NERC-funded study, scientists from the University of Plymouth will work with the Royal National Lifeboat Institution to monitor the currents, under a range of wave and tide conditions at Perranporth beach on the north Cornwall coast. The results will feed into a model that aims to forecast when and where potentially dangerous rip currents will occur around the UK. The results will give rescuers a better chance to save lives, with less danger to themselves.

#### And the winner is...

NERC training fellow Craig Barrie has won an award for his PhD work at the University of Liverpool. The paper – 'On the growth of colloform textures: a case study of sphalerite from the Galmoy ore body, Ireland' – of which Craig is primary author, won 'Best Paper of the Year published by a young author in the *Journal of the Geological Society* in 2009'.

# News

## Microbes could point to ancient life on Mars

HEAT-LOVING bacteria quickly colonised the shattered rock and boiling water left behind when a huge meteorite smashed into a remote part of what is now Devon Island in Canada's frozen north, scientists have shown.

The discovery could help in the search for ancient life on Mars, and suggests future missions there should take a look at meteorite impact craters to see if they contain chemical traces that can only be made by living things.

When it struck some 39 million years ago, a meteorite as much as two kilometres across left behind the 'Haughton impact structure' – a 23km-wide crater filled with a mass of smashed rock, or 'breccia'. The force of its impact also heated up the earth, and scalding water circulated around the newly-formed underground fractures and voids in what geologists call a 'hydrothermal system'.

That system lasted for 10,000 years before finally cooling down. By that time, heat-loving bacteria

already found in the Earth's crust had taken up residence, making their living by turning natural sulphate in the hydrothermal waters into sulphides, in the form of iron pyrite and marcasite – a process known as bacterial sulphate reduction.

'The impact would have fractured and heated up the rock, allowing hot water to begin circulating and making conditions more favourable for these bacteria,' explains Professor John Parnell, a geologist at the University of Aberdeen and lead author of the paper, published in *Geology*.

Microscopic laser sulphur isotope analysis at the NERC Isotope Community Support Facility (ICSF), at the Scottish Universities Environmental Research Centre in East Kilbride, provided the key evidence that the sulphides in the hydrothermal system were produced by bacterial activity. The number of neutrons in atoms of an element varies naturally, producing characteristic differences in mass between these different 'isotopes' of the same element. The bacteria in

question prefer lighter sulphur, with an atomic weight of 32, to the heavier sulphur 34, each atom of which has two extra neutrons. Both these isotopes occur in natural sulphur-bearing minerals. The sulphides in the hydrothermal system of the impact crater were so markedly enriched in sulphur 32 compared to the starting sulphate that bacterial reduction had to be involved.

'There's little chance these sulphides could have been produced by a non-biological process,' says co-author Dr Adrian Boyce, who manages the ICSF. 'The isotopic differences between the starting sulphates and the eventual sulphides are just too great.'

The findings suggest traces of life on Mars could be found from the chemical signature left by long-dead organisms. Boyce explains it's possible to produce miniaturised instruments capable of isotopic analysis in the field, so future Mars landers could be able to investigate the planet's sulphur-bearing minerals.

## CO<sub>2</sub> to blame for major sea level rise by 2100

GLOBAL sea level is likely to rise by anywhere between 0.6 and 1.6 metres by the end of the century, say scientists. Increased levels of atmospheric carbon dioxide (CO<sub>2</sub>) and other greenhouse gases would be responsible for 95 per cent of this rise.

In its most recent report, in 2007, the Intergovernmental Panel on Climate Change (IPCC) estimated that sea level would rise by between 18 and 59 centimetres this century.

'But this estimate is very conservative. The IPCC looked at individual contributions to sea-level rise from thermal expansion of the oceans and glacier melt. We know there's more to sea-level rise than that,' explains Dr Svetlana Jevrejeva from the National Oceanography Centre.

In a paper published in *Geophysical Research Letters*, Jevrejeva and her colleagues describe how they used a statistical model to look at the cumulative effects of both natural changes and man-made changes on 21st-century sea-level rise. 'Our model uses 300 years' of sea-level observations from sites across the world. We used it to reproduce past sea level and because it's such a good match, we're confident we can use it to estimate future sea-level rise,' she says.

During the 20th century sea level rose by 18 centimetres, and 25 per cent of this rise was down to natural factors, such as the Sun warming up the oceans or emissions from volcanic eruptions cooling the atmosphere. In contrast, Jevrejeva and her team found that sea-level rise in the 21st century will be dominated by man-made changes in atmospheric greenhouse gases. Natural factors would be responsible for only 5 per cent of the rise.

The Haughton crater.





Both images - Oxford Archaeology

## Decapitated bodies in Dorset were Vikings

CHEMICAL analysis of teeth from decapitated bodies in an ancient burial pit at Ridgeway Hill in Dorset has revealed that the victims were Vikings. They had all suffered wounds inflicted by a sharp weapon to their skulls, jaws and upper spines, and some also had their limbs hacked off.

'I'm not aware of many other burial sites in this country with this level of slaughter,' says Dr Jane Evans, head of science-based archaeology at the NERC Isotope Geosciences Laboratory (NIGL) in Keyworth, Nottingham. While Vikings are renowned for their raping and pillaging, 'here we've got real evidence that it was the other way round,' says Evans.

'Anglo Saxons rounded up these Vikings and executed them.'

At first archaeologists thought the victims were Iron Age people slaughtered by invading Romans. But after using carbon-14 to date the remains to between AD910 and AD1030 – the exact time of the Viking invasions – Oxford Archaeology asked Evans and her colleague Carolyn Chenery, also from NIGL, to further analyse the victims. Evans and Chenery used isotopic analysis on ten of the 51 victims to find out what part of the world they came from and what sort of food they grew up on.

Isotopes are different forms of the same chemical element, with slightly different atomic weights.

Proportions of different isotopes of the same elements vary around the world, and scientists can use these differences to unearth a wealth of information on subjects like people's origins. Because our modern diets include food from all over the world it's not possible to use the same approach to work out where people come from today. But in this case, as Evans explains, 'isotopes from local drinking water and food are fixed into the enamel and dentine of growing teeth. This means we can figure out what sort of food people ate and where they're likely to have eaten this food.'

Both strontium and oxygen isotopes revealed that the burial pit

victims grew up in countries with a much colder climate than Britain's. 'It's the only site where we've done isotopic analysis and demonstrated that the victims are all from outside Britain,' says Evans.

Surprisingly, the isotopic analysis revealed that the men came from all over Scandinavia – one individual was traced to north of the Arctic Circle. 'The group could have been an army drawn from a large area,' suggests Evans. Other injuries, such as a cut to the pelvis, blows to the chest and stomach, as well as defensive injuries to the hands, are also consistent with a major slaughter.

# News

## Promiscuous females save species from extinction

IT'S NOT just males who are known for their promiscuity; females are just as bad. But it turns out that there's a very good reason for this: promiscuous females could be essential for some species' survival.

Previous approaches to understanding this behaviour have ignored any benefits to the whole species. Now some researchers think the existence of a chromosome called the sex-ratio distorter, which causes populations to have more females than males, could prevent extinction.

'The sex-ratio distorter is a set of genes carried on the X chromosome that violates the assumption of equal inheritance,' explains Professor Nina Wedell from the University of Exeter. These genes make sure that all sperm carrying a Y chromosome are killed and that only female offspring are possible. 'We figured that if females are limited to one mate and that mate carries the sex-ratio distorter, males would disappear. With no males, the population should eventually die out,' says Wedell.

To test this idea, Wedell and colleagues from the University of Liverpool describe in *Current Biology* how they bred 48 groups of the fruit fly *Drosophila pseudoobscura*, known to carry the sex-ratio distorter chromosome.

They divided the groups into four set-ups; in the first, females were limited to mating with just one male, while in the other three the females could mate with up to six males.

The researchers found that in groups where the females mated with multiple males, the frequency of the sex-ratio distorter chromosome fell rapidly; so much so that by generation nine, the sex-ratio distorter chromosome was much rarer in promiscuous females than in the other females.

But in the 'monogamous' group, by the fifteenth generation there were more females than males and 40 per cent of these populations had gone extinct because the males just died out. In contrast, all 36 promiscuous populations survived.

'The extinction of populations limited to one mating was clearly down to the sex-ratio bias, which results from the sex-ratio distorter chromosome. Multiple mating by females reduces the frequency of the sex-linked distorter and is likely to do so for many other selfish genetic elements,' says Wedell. 'So, the vulnerability of monogamous populations to extinction by sex-ratio distorters may provide a generally overlooked explanation for why promiscuity is so prevalent.'



## In brief

### BioBlitz in the Year of Biodiversity

May saw the start of the 2010 BioBlitz season. A bioblitz is a field survey where scientists and the public race against the clock to tickle, tease and net as many species as they can find. They run for at least 24 hours so nocturnal species don't miss out, and produce a valuable scientific snapshot of an area's biodiversity. Bioblitzing is great fun and anyone can take part – you can even organise your own – and as 2010 is the Year of Biodiversity it's a great time to get involved. There are more events through July and August: to find one near you visit: [www.bnhc.org.uk/home/bioblitz](http://www.bnhc.org.uk/home/bioblitz)



### Statue 'DNA finger-printed'

The British Geological Survey has traced stone from a statue of Robert Burns, now in Australia, to its original source in Scotland. When vandals damaged the 1830s statue, the National Trust of Australia sent samples from the monument to BGS in Edinburgh. Scientists carried out microscopic studies to 'fingerprint' the stone, which turned out to be from near Stirling. The probable original source is now a landfill site, but a near-match was found from Old Drumhead quarry nearby; the owners donated stone for the repairs.

### Science of the built environment

The high-profile 'Transition to a Low Carbon Economy' conference saw NERC joining forces with the Engineering and Physical Sciences Research Centre to show how environmental, physical and engineering sciences can combine to address the challenges of climate change in the urban environment. Among the subjects covered in their session, the extreme effects of heat in towns and cities – the urban heat island effect – was hotly debated; the challenge is to retrofit existing housing stock to address overheating in the summer as well as energy efficiency. For more on the built environment, listen to the Planet Earth online podcast at <http://planetearth.nerc.ac.uk/multimedia/story.aspx?id=736>

### Carbon capture – and reuse?

Scientists from the British Geological Survey will be part of a major new study to investigate techniques for carbon capture and storage (CCS) based on mineralisation. This promising new area of carbon sequestration involves converting CO<sub>2</sub> into usable materials – a practical alternative to the more common approach of capturing the gas for storage underground. Certain minerals can react with CO<sub>2</sub> to produce a solid carbonate product, which can be stored, used as an aggregate or turned into products such as bricks.



## Wild gorillas are affected by ecotourism

A NEW REVIEW of the effects of ecotourism on western lowland gorillas has shown that the presence of tourists and research teams disturbs the animals and recommends the increase of the minimum observation distance to ten metres.

Ecotourism has become an important source of income for remote African communities living within the natural habitats of famous animal species. Gorilla tourism in particular has boomed with the strong market demand, providing jobs and business opportunities for local people in several African countries. Tempting foreign tourists to enjoy natural parks has also become a strong motivation for governments to invest in conservation, while the presence of researchers, tourists and tourism infrastructure can work as a strong deterrent to poachers.

Ecotourism involves a certain amount of risk for the gorillas, which are known to be vulnerable

to human diseases. Their immune system is not as hardened as ours, and the communication of something as trivial as a common cold from a human may have the potential to threaten the health of an entire family group. To protect the gorillas, authorities have previously established a minimum distance of seven metres to prevent disease transmission. But is this enough? Michelle Klailova, a PhD student at the University of Stirling, studied a group of gorillas settled at Bai Hokou, Central African Republic, to document their behaviour in response to human presence.

Klailova and her research group followed one silverback male named Makumba for one year and recorded his vocalisations, daily activities and interactions with his 12 family members. She compared these with the size and type of the human group – which included local trackers, scientists and often tourists – and its distance from



Quanter Gunn/istockphoto.com

the gorillas. Klailova found that the size of the group did have an effect on Makumba and his family. As the numbers increased, the gorillas spent less time feeding and instead engaged in unfocused, mixed behaviours. 'As humans move closer he sacrifices part of his feeding time to monitor us, and this cannot be good,' says Klailova.

The seven-metre minimum distance is based on disease transmission risk. In their *American Journal of Primatology* paper, Klailova and her team recommend 'an increase of the minimum observation distance

to ten metres, to incorporate the psychological stressors of close human contact.' Ideally, the distance should be over 18 metres, at which the gorillas stop reacting to humans but, says Klailova, 'this is not a realistic goal in dense forests.' And she believes it's important to keep the impact of human proximity in perspective. 'Human factors explain only 10 per cent of the overall variance in the results, which means there are many other important, but yet undetermined, non-human factors that are affecting the gorillas' behaviour,' she says.

## Life at the South Pole

SCIENTISTS have found a simple but functioning community of bacteria and micro-organisms thriving in the lakes and soils of the Dufek Massif region in Antarctica. These are the southernmost terrestrial and aquatic ecosystems ever described on Earth, less than 800km from the South Pole.

British Antarctic Survey biologist Dr Dominic Hodgson led a scientific expedition to the site in December 2003. 'Our aim was to do a bit of traditional descriptive science to find out what is there, and combine this with some of the latest techniques in molecular biology,' he says.

The team collected samples of the water and the mats of blue-green algae in the lakes and soils. 'In the lakes the mats are surprisingly abundant covering most of the lake floors, whereas on the soils the mats look like dried lettuce; they grow very large there because there are no grazers eating them,' says Hodgson. They also photographed a few pinhead-sized lichens, so small and rare that sampling was impossible.

The team didn't find any evidence of the roundworms or arthropods (invertebrates with external skeletons, like crabs) common in other Antarctic ecosystems, and identified only one diatom shell – a type of

phytoplankton – which was likely brought to the lake by the wind. They found six species of blue-green algae (cyanobacteria), one type of green algae and 32 different bacteria. The only animals living in the area are some small aquatic creatures called rotifers and three species of tardigrade, a group of microscopic invertebrates common in aquatic environments. And that's it.

'The list is incredibly limited and it fits on a normal sheet of paper,' says Hodgson, who reported the findings in *Polar Science*. 'If you would apply the same analytic methods to samples from anywhere else, you would get pages and pages listing hundreds of species.'

Hodgson says that the community found in the lakes and soils of the Dufek Massif is a functional ecosystem, but says 'this is as simple as ecosystems get.'

The Dufek Massif has a harsh climate and is isolated by its remote location, which probably explains its extreme lack of biodiversity. Genetic analysis revealed that the Dufek Massif's blue-green algae are similar to those in other extreme environments. But the local tardigrade species, the lichen and some bacteria aren't found anywhere else. The discovery of these endemic species suggests that Antarctica may not be as barren as we thought.