

News

Environmental scientists jump on Google Earth

THE BRITISH Geological Survey is leading the geological surveys of more than 55 nations to create the first global digital geological map. The project, known as OneGeology, is a searchable website containing geological maps for the entire planet, initially at a scale of 1:1,000,000.

The team will make OneGeology available through Google Earth and other browsers. The initiative will start producing results by mid-2008 and grow steadily as more countries pool information.

Geologists are not the only environmental scientists to see the potential for freely

available global mapping software. At a meeting in Cambridge in April, organised by Jon Blower from NERC's Earth Systems Science Centre, researchers discussed how the scientific community can use these systems.

Jon illustrated the power of the technology by superimposing an animation of the track of Hurricane Katrina onto an animation of sea surface temperatures in the Caribbean and Atlantic.

He said, 'A key capability of these systems is their ability to clearly show diverse data from different providers. This reveals new information that would otherwise have been hidden.'

Researchers at the British



Antarctic Survey already use the system to display live information on ships, buoys and tagged penguins.

www.onegeology.org

Bird-ringing stresses birds out

BIRD-RINGING techniques used to track wild birds can cause stress and lead to erratic behaviour, according to research at Cardiff University.

Following release, many birds temporarily stopped foraging for food in their usual locations and failed to return to their nests for several hours. During these long absences nest temperature fell, leading to slower embryo development.

NERC Fellow Rob Thomas said, 'It's important to consider these effects in the design of ethical and scientifically rigorous field experiments.'

Rob is now working with the British Trust for Ornithology to develop this research and to revise regulations for bird ringers.

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Monsoon variability targeted by researchers



A UK-INDIA partnership has successfully secured funds for a four-year project to rapidly develop improved ways of predicting monsoon variability on timescales of weeks to decades. The team based in the UK at the Walker Institute, University of Reading, and in India at the Institute of Tropical Meteorology

in Pune, will also aim to apply those predictions at local and regional levels.

The research, which is one of six awards from the UK-India Education and Research Initiative (UKIERI), will be achieved through a series of exchange visits, workshops and PhD studentships.

The awards total £5 million and involve five institutes in India as well as the University of East Anglia, the European Centre for Medium-Range Weather Forecasts, the Hadley Centre and the University of Reading.

www.reading.ac.uk/about/newsandevents/releases/PR383.asp

To save a mockingbird

A NEW scheme to re-introduce the Galapagos mockingbird, which is on the verge of extinction, began in March. The project will use techniques developed from a recent NERC-funded project to reduce inbreeding in the Mauritius kestrel, which has helped bring the species back from the brink of extinction.

Only four species of mockingbird are left on the Galapagos. One species is endangered. It has already gone extinct on the main island and there are less than 200 birds left on two smaller islands.

Conservation biologists Steve Ewing from the University of Glasgow and Lukas Keller, now at the Zoologisches Museum, Zürich and colleagues want to maximise genetic diversity of the mockingbird populations to improve survival rates.

Lukas said, 'We started in March with a workshop in the Galapagos. We will begin moving mockingbirds in 2009.'

'I am convinced if we had not done the work on kestrel inbreeding we would not have credentials to do the Galapagos project.'

Under threat: the Galapagos mockingbird.



Tom Vezo/Nature Picture Library

Small but perfectly formed

IN TERMS of nanomaterials, small is turning out to be quite beautiful from a commercial, medical and environmental viewpoint. But do the enhanced properties of nanomaterials mean enhanced risks to the environment and human health?

NERC, in collaboration with Defra and the Environment Agency, announced in May approximately ten exploratory grants to investigate the environmental fate, behaviour and effects of nanomaterials in terrestrial, aquatic and marine

environments.

The work is part of the ongoing Environmental Nanoscience Initiative. The first results from the initiative are reported on page ten.

The second International Conference on Environmental Effects of Nanomaterials will be held on 24-25 September at the Natural History Museum (See www.sebiology.org).

www.nerc.ac.uk/research/programmes/nanoscience

Overcoming hurdles

SCIENTISTS working on a satellite instrument that was at one point almost given up as a lost cause have announced that they are now receiving high-quality data on atmospheric temperatures and chemical composition.

In July 2004, NASA successfully launched the Earth observation satellite Aura to examine atmospheric composition in unprecedented detail. The success was overshadowed in the UK by the silence from one of Aura's four instruments – the joint NERC/NASA-funded High Resolution Dynamics Limb Sounder (HIRDLS). The instrument was due to measure atmospheric composition, including ozone and particulates.

During the launch a piece of protective plastic film had torn free and lodged over the instrument's only optical beam, reducing visibility to just 20 percent.

Since the launch, scientists led by John Barnett from the

University of Oxford and John Gille of the University of Colorado have painstakingly developed new algorithms to maximise the data retrieved from HIRDLS.

'We spent half a year trying to clear the obstruction before we started looking at how we could use what we had got,' said John Barnett.

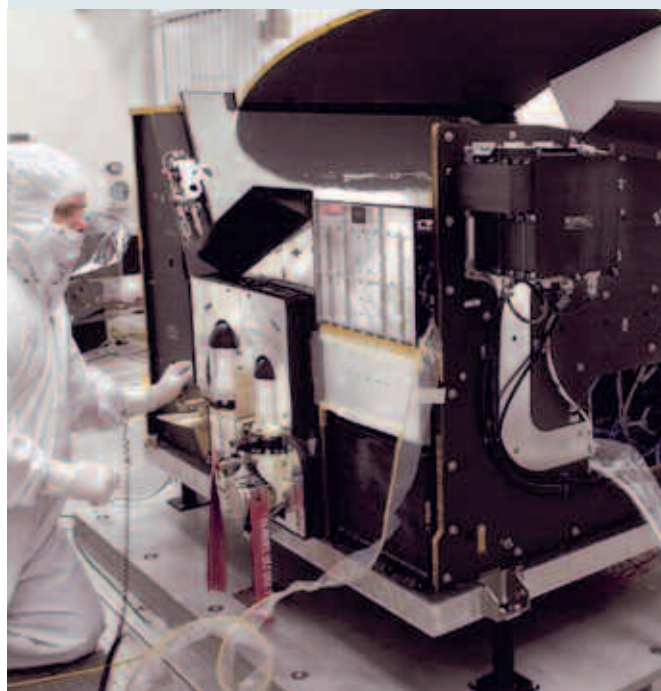
'We radically changed the way the optical beam moved and got NASA to tilt the spacecraft to give us special calibration data. Fortunately the rest of the instrument works even better than planned, and this was a big help.'

Now, even with 80 percent of the optical beam still blacked-out, in one day the team can retrieve data from nearly all of the world.

NERC's British Atmospheric Data Centre will distribute data in the UK.

Dr John Barnett

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Dinosaur extinction not responsible for present-day mammals

A NEW discovery rewrites our understanding of how we evolved on this planet. The ancestors of all mammals on Earth diversified as a result of a global warming, according to research reported in *Nature* by scientists from Imperial College London and the Zoological Society of London. It contradicts the previously accepted theory that a mass extinction event, that wiped out the dinosaurs 65 million years ago, prompted the rapid rise of the mammals that we see today.

The research team has been working for over a decade to compile a 'tree of life' from

existing fossil records and new molecular analyses.

Andy Purvis from Imperial College London explains, 'Our research has shown that for the first ten or fifteen million years after the dinosaurs were wiped out, present day mammals kept a very low profile, while other types of mammals were running the show. It looks like a later bout of global warming may have kick-started today's diversity – not the death of the dinosaurs.'

'The delayed rise of present-day mammals', Nature, 29 March 2007.

Why are we here? The mystery deepens.



D. Van Ravenswaay / Science Photo Library

Carbon offsetting could fund peatland regeneration

THE PEATLANDS of England and Wales could store up to 41,000 tonnes of carbon per year, if they were in pristine condition. But erosion and damage mean that the peat is actually releasing carbon into the atmosphere at a rate of 381,000 tonnes a year, according to researchers on the Rural Economy and Land Use (RELU) programme.

The cause of the release is the vast system of drainage ditches dug across the uplands during the 1950s. This was an unsuccessful attempt to increase land productivity. Scientists say that if these could be blocked then peat would form again.

Analysts at Defra suggest that the cost of blocking one hectare of peat drains is about £188. RELU researchers have hit on the idea of working with a carbon offsetting company that would allow consumers to offset their carbon footprint by paying for upland regeneration.

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Folkestone Earthquake

THE LEVEL of damage caused by the earthquake which shook Folkestone and the rest of Kent on 28 April has rarely been exceeded in the last few hundred years, according to scientists at the British Geological Survey (BGS). But the geologists add that the earthquake was by no means unusual in the UK: earthquakes of a similar magnitude usually strike somewhere on land or offshore every five years.

BGS geologists used the UK seismic monitoring network to

show that the excessive damage was caused by the close proximity of the earthquake's epicentre to Folkestone. The instruments showed that the epicentre was adjacent to the town at a depth of just two kilometres.

Historical records show that earthquakes in or near the Dover Straits struck in 1950, 1776, 1580 and 1382.

The last earthquake felt by residents in Folkestone was actually a Dutch earthquake, with an epicentre near Maastricht, in 1992.

www.earthquakes.bgs.ac.uk

Orchid's little helpers

NEW RESEARCH demonstrates why some orchids are notoriously difficult to cultivate from seed – they need specific fungi to help them grow. Scientists have known for a long time that fungi play a vital role helping orchids germinate, but until now, they knew very little about how they helped the adult plant.

Duncan Cameron and his colleagues from the University of Sheffield, have shown that the adult green orchid, creeping lady's tresses (*Goodyera repens*), takes up nitrogen and phosphorus, two nutrients for essential growth, from fungi living close to or within its roots. In return, the plant gives up some of its carbon as sugars.

Duncan said, 'We introduced radioactive phosphorus which could be traced and quantified as it moved between the plant and fungus, which confirmed for the first time this mutualistic behaviour.'

'Mycorrhizal Acquisition of Inorganic Phosphorus by the Green-leaved Terrestrial Orchid Goodyera repens', Annals of Botany, 1-4, 2007.

Evidence of climate driving evolution and ecology



RELATIVELY minor environmental influences, such as one harsh winter, can force evolution in animal populations and rapidly change population sizes.

Scientists studying Soay sheep in the Outer Hebrides noticed that in years with long, cold winters the sheep population grew fastest when there were many large individuals within the population.

Tim Coulson from Imperial College London explained, 'Data shows that in the 1980s big sheep were genetically favoured in this population because big sheep had more chance of surviving the harsh winters.'

'But, as the climate changes and the Soay sheep are not subject to such tough winters, there will be reduced natural selection for

larger animals. This could significantly affect the population dynamics of the Soay sheep overall'.

The research, reported in *Science*, has shown that population change is affected by body size, and that body size, in turn, is affected by a number of factors including genetics, climate, and the availability of food. The scientists have linked together, for the first time, the big ecological picture with the genetic make-up of individual animals.

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'The Evolutionary Demography of Ecological Change: Linking Trait Variation and Population Growth', *Science*, 16 March 2007.

Major carbon sink now releasing CO₂

STRONGER winds over the Southern Ocean caused by increasing greenhouse gases and ozone depletion have led to a release of carbon dioxide from the ocean into the atmosphere. The research is the first evidence that recent climate change has weakened one of the Earth's natural carbon sinks.

Lead author Corinne Le Quéré from the British Antarctic Survey and the University of East Anglia said, 'We can say climate change itself is responsible for the saturation of the Southern Ocean sink. This is serious. All

climate models predict that this kind of feedback will continue and intensify during this century. The Earth's carbon sinks – of which the Southern Ocean accounts for 15 percent – absorb about half of all human carbon emissions. With the Southern Ocean reaching its saturation point more CO₂ will stay in our atmosphere.'

Stronger winds churn up the ocean bringing more dissolved carbon to the surface.

'Saturations of the Southern Ocean CO₂ sink due to recent climate change.' *Science*, 18 May.

Still learning from Archimedes

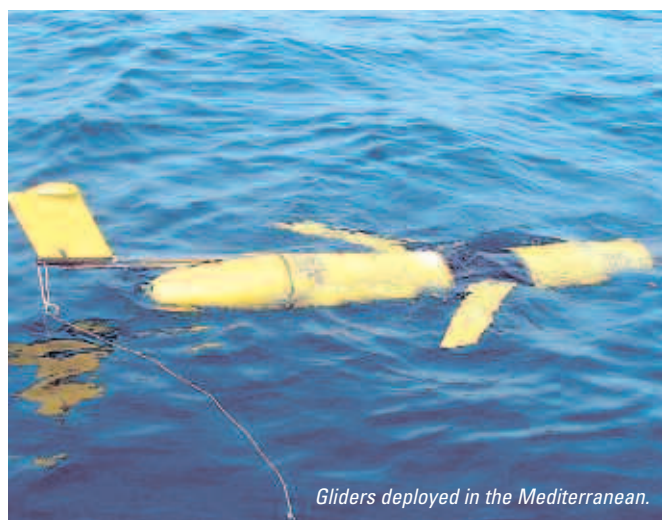
GRACEFUL, simple, underwater gliders are providing researchers with excellent data on deep convection in the Mediterranean.

Underwater gliders combine high-tech design with buoyancy principles first put forward by Archimedes in 250BC. They sink slowly, but their shape forces them to slip forward through the water as they fall. A change in volume plus a tilt backwards and the machine travels upwards on a gentle incline through the water column. Sea gliders can use these simple manoeuvres to travel great distances, even

crossing oceans.

In 2007 the team from the National Oceanography Centre, Southampton deployed three gliders in the Gulf of Lion. They used satellite communication systems during the three-month project to adapt the glider mission as conditions changed.

Oceanographer David Smeed said, 'We can control where the gliders go from my office in Southampton. We are combining measurements from the gliders with models of convection to gain a better understanding of mixing in the ocean.'



Gliders deployed in the Mediterranean.

Calculating the Olympics' carbon footprint

THE BRITISH Geological Survey and the University of Leeds have been awarded a grant to investigate some of the environmental impacts of building the 2012 Olympic Park.

Andrew Bloodworth, the programme co-ordinator said, 'Such an enormous construction project will probably call upon resources from quarries right across the UK and we need to see how this will effect the environment.'

Using carbon footprint calculations, the team will

compare the impact of using different methods of transport from a range of likely quarries. This information will help to identify potential problems with infrastructure and encourage suppliers to use more sustainable options such as rail and barge rather than relying on roads.

A PhD studentship is available. Please visit this website for more details. www.geog.leeds.ac.uk/research/csap/topics/bigfeet.html

Hunting warm, resting cool

DOGFISH have a hunting strategy that helps them save energy. These and other sharks that live on the ocean floor hunt in warm, shallow waters where there is plenty of food, but move to deeper, cooler water to rest and digest their prey.

David Sims from the Marine Biological Association said, 'We've noticed other marine species rest in deeper waters but this tends to be a means of hiding from their predators. Benthic sharks have little to fear from predation so we knew there had to be another reason.'

Some sharks are cold-blooded and the temperature of the water can control their metabolic rate with warmer temperatures leading to an increase in energy expenditure. The scientists calculated that resting in the cooler waters enables these sharks to save their energy by six percent.

'Hunt warm, rest cool: bioenergetic strategy underlying diel vertical migration of a benthic shark', Journal of Animal Ecology, Vol 75.

Journey to the centre of the Earth



Recovering samples from a gap in the Earth's crust.

Roger Searle

ONE of the world's most advanced research ships has just completed her maiden voyage to investigate a huge 'wound' in the Earth's crust.

The *James Cook*, returned on 17 April from an expedition to the Mid Atlantic Ridge, a massive underwater volcanic mountain range. Tectonic plates at the ridge move away from each other and usually the gap fills with hot, molten rock rising from the mantle to form the Earth's crust. But at the location the scientists visited, much of the melt seems to be missing and the mantle is exposed on the seabed.

Roger Searle, who led the expedition said, 'The new ship

worked extremely well, allowing us to sample and map the seafloor with an unprecedented precision. This is probably the first area where the mantle has been observed extensively on the seafloor.'

The team includes scientists from the National Oceanography Centre in Southampton, Cardiff University, Durham University, the British Geological Survey, and the universities of Houston, Paris and Wyoming. They are now analysing the data to reveal new insights into how the oceanic plates are formed. *Planet Earth* will be reporting the findings later in the year.

Visit the official cruise website: www.classroomatsea.net

Ocean circulation 'short-circuit' discovered

COLD WATERS rise from the depths an order of magnitude faster than predicted, in some parts of the Southern Ocean, according to oceanographers tracking helium ejected by submarine volcanoes.

The research reported in *Nature* gives new insights into the global ocean circulation, which has a central role in the climate system. The work suggests that the giant, often sluggish overturning circulation driven by winds and tides occurs in bursts in the Southern Ocean. The team led by Alberto Naveira Garabato from the National Oceanography Centre, Southampton discovered a 'short-circuit' in a region above rough, mountainous seafloor, where deep waters upwell rapidly and seem to bypass the slow circulation.

'It seems much of the deep water upwelling in the Southern Ocean takes place from the tip of South America – Drake passage – to just south of the Falklands, and that it drives strong vertical mixing between the upper and lower layers of the ocean,' said Alberto.

The helium tracer from underwater volcanoes in the Pacific allowed the team to



measure the rates of mixing and upwelling over an area spanning one tenth of the Antarctic Circumpolar Current (ACC), the world's most powerful current.

Traces of helium dissolve in the deep sea. A plume of this marked water travels down the coast of Chile. It is injected at depth into the ACC on the Pacific side of Cape Horn. It then streams through into the Atlantic with the ACC, where it spreads out. The team measured this spread to deduce the overturning circulation 'short-circuit.'

'For many years, oceanographers have regarded

the overturning circulation in the upper kilometre of the ocean as being independent of that in the abyss. Our observations show that the two are very much intertwined in the Southern Ocean, and that this has substantial implications for how we represent the ocean in climate models', added Alberto.

Climate change researchers will use this information to improve the way climate models represent ocean circulation.

'Short-circuiting of the overturning circulation in the Antarctic Circumpolar Current', *Nature*, Vol 447, 10 May 2007.

Virus causes coral bleaching

A VIRUS that kills algae on coral reefs may be causing widespread bleaching, according to scientists at Plymouth Marine Laboratory and the University of Plymouth.

The virus, which kills tiny symbiotic algae essential for the survival of corals, could explain the bleaching now reported in over 50 countries and across three oceans.

Coral bleaching is usually

triggered by warmer waters. But the underlying cause of coral bleaching and the mechanisms involved remained largely unknown until now.

Willie Wilson said, 'The virus is latent in the algae. It only starts to infect the symbiotic algae when the coral is stressed by temperature or UV light. It provides a plausible explanation for some of the rapid bleaching we see in coral reefs.'

The work shows that viruses play an important role in coral reef dynamics.

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'Characterisation of a Latent Virus-like Infection of Symbiotic Zooxanthellae'. *Applied and Environmental Microbiology*, May 2007.

In brief

Space race

A new Earth observation centre launched in May will boost the UK's position in the global space industry. The Centre for Earth Observation and Instrumentation (CEOI) will ensure scientists in the UK have the instruments and technologies they need to research global environmental change from space. The centre, a collaboration between NERC and the Department for Trade and Industry, will be led by Mick Johnson.

Living with Environmental Change

The UK's main funders of environmental science intend launching the *Living with Environmental Change* programme this autumn. The new initiative, which aims to provide solutions to environmental change as well as help the UK to capitalise on emerging opportunities, will be the largest single programme NERC has helped coordinate. See *Leader* page 1. www.nerc.ac.uk/research/programmes/lwec

Blockbuster Antarctic exhibition launched

Have you got what it takes to be an ice cadet in the most remote place on Earth? The British Antarctic Survey and the Natural History Museum launched Ice Station Antarctica on 25 May. The blockbuster family exhibition will give children the experience of living and working on the coldest continent. It remains at the museum until April 2008 before embarking on a world tour. www.nhm.ac.uk

World's fourth largest lake shrinks by two-thirds

Heidi Oberhaerli



IN LESS than 50 years the Aral Sea, which straddles the border between Kazakhstan and Uzbekistan, has shrunk by two-thirds.

Researchers from NERC's Isotope Geoscience Laboratory and University College London (UCL) blame human activity for the decline, which has now turned the former sea into two large lakes, the Northern Aral and the Southern Aral. The change is largely due to the former Soviet Union diverting two rivers that feed the lake, the Amu Darya and the Syr Darya, for irrigation.

The researchers, who collaborated with Kazan State University and the University of Nottingham, say humans as far back as Genghis Khan and the White Huns have had a negative affect on the lake but the more recent changes have led to a 90 percent drop in the

lake's fish species and a loss of more than 250 species of plankton.

A recently constructed dam is helping to halt the regression of the smaller Northern Aral but the decline of the Southern Aral continues unabated.

UCL researcher Patrick Austin said, 'The Aral Sea is often in the news due to the dramatic decline in lake levels since the early 1960s. This has resulted in an ecological and humanitarian disaster. Through our investigations, we were able to work out that regressions happened in the recent past and were due to a combination of climate change and human activity, notably, on one occasion, the destruction of irrigation systems by Genghis Khan and the Mongols in 1221.'

The Aral Sea was once the world's fourth largest lake.



Drought resistance: challenging the textbooks

MAIZE and sugar cane, two of the world's most important food plants, might be more at risk from drought than previously thought.

Plants have evolved two mechanisms to take up carbon from carbon dioxide (CO₂). The most popular method is known as C₃; but maize and sugar cane use the less popular C₄. Hot weather can be a problem for C₃ plants, which include rice, wheat and potatoes. They photosynthesize by absorbing carbon dioxide through their stomata (pores in the leaves), but open stomata can allow more water to evaporate. Textbooks say that C₄ plants have an advantage in these conditions because they have a pump which takes in CO₂ whilst their stomata are partially closed – maintaining a high rate of photosynthesis.

However, research on the grass *Alloteropsis semialata*, the only species with both C₃ and C₄ types, adds a new twist to this story.

Paper author Brad Ripley, from Rhodes University said, 'surprisingly, the C₄ form lost its photosynthetic advantage during severe drought because of metabolic limitations in its CO₂ pump. This gives us a clue as to why the abundance of C₄ grasses seems to decline in arid environments despite their high water efficiency.'

If this response turns up in all C₄ species, it could have huge implications for the environment and crop management. For example, scientists are currently exploring techniques to introduce C₄ photosynthesis into rice – a C₃ plant – in the hope of increasing yields in dry areas.

But it may not be time to rewrite the textbooks just yet; the next step for the research team

will be to see if this metabolic limitation occurs in other C₄ species.

'Drought constraints on C₄ photosynthesis: stomatal and metabolic limitations in C₃ and C₄ subspecies of *Alloteropsis semialata*', *Journal of Experimental Botany*, Vol 58, April 2007.

Next Sumatran tsunami likely to be less severe

NEW research indicates that it is very likely another large earthquake, possibly as large as the Boxing Day 2004 earthquake (magnitude 9.2), will strike the coast of Sumatra within a lifetime, but the subsequent tsunami could be much less severe than in 2004.

A team of scientists, led by John McCloskey from the University of Ulster, simulated 100 different earthquakes off the coast of Sumatra and then calculated the likely tsunami wave heights. The research revealed that only 20 percent of the modelled earthquakes produced waves greater than five metres at the vulnerable coastal cities of Padang and Bengkulu. In 2004, a wave 30 metres high hit the north-west coast of Sumatra. The team also discovered that the time it takes for a tsunami to reach these vulnerable coastal areas is about 30 minutes, irrespective of the size of the earthquake.

John said, 'With a population in excess of one million living on western Sumatra's low coastal plains, it's very important that communities prepare for a future tsunami. A half hour warning could give people a bit of time to move to higher ground or at least to higher parts of buildings.'

War veterans test negative for depleted uranium

TESTS designed to detect depleted uranium in the urine samples of Gulf War veterans even after 15 years have shown no evidence of contamination.

Researchers at NERC's Isotope Geosciences Laboratory, based at the British Geological Survey (BGS) and Royal Holloway University of London, in conjunction with the Depleted Uranium Oversight Board, developed a very sensitive test to detect traces of depleted uranium (DU) in urine from soldiers involved in the 1991 Gulf War and the Balkans conflicts. The work also included the testing of a smaller control population for comparison.

These tests were designed to estimate the maximum level of DU exposure to veterans up to 15 years ago. None of the 464 urine samples tested positive for exposure to DU, though the extent of any initial exposure of those tested was unknown.

Head of NERC's Isotope Geosciences Laboratory Professor Randall Parrish said, 'To my knowledge these were the first tests of this kind to have been carried out.

'The tests were voluntary. Anyone who wanted to put themselves forward for testing could do so, provided they could show that they had been in situations where they could have

been exposed to depleted uranium.'

The BGS and University of Leicester team also conducted another study around a depleted uranium munitions factory in Albany, New York State.

'It has been more than 20 years since DU contaminated the land around the site yet we could clearly detect it in a significant proportion of the urine samples of the people we tested,' said Randy.

The findings of the veterans' study were published earlier this year as the Depleted Uranium Oversight Board's final report.

Females attracted to healthy eaters



FEMALE fish are attracted to males who have eaten antioxidants, according to new research. Male sticklebacks eat brightly coloured carotenoids which contain a pigment that gives fish an attractive red throat during the breeding season. Carotenoids are also natural antioxidants which slow down the rate of aging and support a healthy immune system.

Researchers from the Universities of Glasgow and Exeter discovered that males who ate fewer carotenoids still tried to produce a bright red throat, but could only do so by diverting these antioxidants

away from their health promoting role. So by trying to look as good, they aged faster.

One of the researchers, Thomas Pike, said, 'It seems that females can tell if males haven't eaten many carotenoids, even if they do look quite red. They probably found these males less attractive because they were more likely to die before they had finished looking after their young.'

'Carotenoids, oxidative stress and female mating preference for longer-lived males', Proceedings. *Biological Sciences*, 2007.

Cooler band on planet play Live Earth

FORGET drug-addled almost-ran Pete Doherty and his band Babyshambles, the coolest group on the planet is the British Antarctic Survey's house band Nunatak. The 5-piece indie rock outfit based at the Rothera research station on the West Antarctic Peninsula will perform in front of a TV audience of two billion at the Live Earth concert on 7 July. Other acts confirmed in the line-up include Madonna and the Red Hot Chili Peppers.

The Nunatak gig, broadcast live from Antarctica, will mean all seven continents will be involved in the event organised by former US Vice President Al Gore.

Though the global audience for the gig will be enormous, the band will actually only play in front of 17 of their wintering colleagues. The concerts, to raise awareness of the climate change issue, will feature over 100 of the world's top musical acts.

www.liveearth.org

In brief

Brazil visit

Centre for Ecology & Hydrology (CEH) director Pat Nutthall joined the government's chief scientific advisor Sir David King in Brazil for the launch of the UK-Brazil Year of Science. The small scientific delegation want to identify opportunities for UK-Brazil research, in particular projects investigating the economic valuation of rainfall generated by the Amazon rainforest and biodiversity data collection and interpretation.

Reserves protect corals

Researchers working on one of the largest marine reserves in the Caribbean have reported that when fish, such as parrotfish, were protected from fishermen the number of young corals doubled. The team, funded by NERC and the National Oceanic & Atmospheric Administration in the US, showed that grazing parrotfish kept seaweed at bay allowing growing room for the coral.

New life found in icy depths

Carnivorous sponges, free-swimming worms, crustaceans, and molluscs are some of the hundreds of new species discovered by researchers in the ocean around Antarctica. British Antarctic Survey marine biologist Katrin Linse said, 'What was once thought to be a featureless abyss is in fact a dynamic, variable and biologically rich environment.'

'First insights into the biodiversity and biogeography of the Southern Ocean deep sea', *Nature*, 16 May.