MASTODON DNA SEQUENCED
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L. O'KEEFE/SPL

boost in the growth of forests and swamps. But factoring in ozone means that it looks less likely that this carbon sink will grow fast enough to keep pace with the increasing emissions.

Eva Pell, who studies the effects of ozone on plants at Pennsylvania State University in University Park and who was not involved in the study, finds the results credible. "There is no doubt that ozone reduces CO_2 fixation," she says. "It makes sense that the adverse effects of ozone would be dampened by elevated CO_2, and the ability of plants to serve as carbon stores in an elevated CO_2 environment would be reduced by elevated ozone."

In 1901, according to the researchers' calculations, plant growth was responsible for storing 113 billion tonnes of carbon worldwide. By 2100, this figure is predicted to be 171 billion tonnes — without ozone it would be more than 200 billion tonnes, they say. Their results are published online this week (S. Sitch *et al. Nature* doi:10.1038/nature06059; 2007).

Different plant species vary in their sensitivity to ozone, and these figures reflect predictions based on a fairly high average level of toxicity, says team member Bill Collins of the Met Office. But even in the researchers' low-sensitivity calculations, there's likely to be a dent of around 15 billion tonnes in overall carbon sequestration as a result of the effects of ozone.

"The bottom line is that ozone is a greenhouse gas, so it's known to contribute to the greenhouse effect. Our study says you should double that predicted contribution," says Collins.

Unlike most greenhouse gases, ozone is a short-lived, regional pollutant that can be tackled at an individual level using catalytic converters, for example, to reduce precursors to ozone, Sitch suggests. ■

Michael Hopkin

Memory seen in the making

The physical changes that occur when the brain makes a new memory have been observed for the first time, say researchers, who hope to go on to map the distribution of memory across brain regions.

Gary Lynch of the University of California, Irvine, and his colleagues examined the junctions between neurons — synapses — in three dimensions using a technique called restorative deconvolution microscopy (RDM). This consists of a sensitive light microscope with computer algorithms that analyse light scattered above and below the focal point, producing a three-dimensional 'trace' of an object's structure.

"We saw that the synapses had actually changed shape as a result of the new memory."

In previous work, the group developed a fluorescent marker that attaches to synapses in the brain that have recently undergone a certain type of neuron-to-neuron connection believed to be responsible for encoding memory, called long-term potentiation (LTP) (L. Y. Chen *et al. J. Neurosci.* 27, 5363–5372; 2007).

The team exposed live rats to a novel environment and allowed them to learn its layout. They then removed the animals' brains to examine the hippocampus — a region involved in memory — using RDM to observe individual synapses. A second group of rats was shown the new environment but not allowed to explore it before their brains were examined.

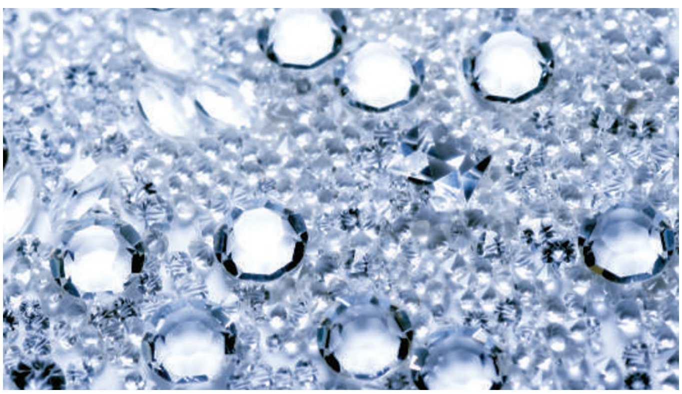
Only rats that had undergone learning and memory acquisition showed new synaptic growth, Lynch says (V. Fedulov *et al. J. Neurosci.* 27, 8031–8039; 2007). And the hippocampal synapses to which the LTP fluorescent marker attached were 50% larger than other synapses not involved in LTP.

Furthermore, when the group looked at hippocampal slices from a third group of rats, which had been allowed to learn the same new environment but been given a drug to block LTP, the synapses showed no new growth, and were similar to those of the second group. This indicates that the new synaptic growth observed in the study is a result of LTP, Lynch asserts.

"We saw that the synapses had actually changed shape as a result of the new memory," Lynch says. "They went from oval to circles, which have a greater surface area." He now aims to use the technique to see which other areas of the brain might be involved in memory.

Being able to look at memory at the synaptic level is a major advance, says Mark Bear, a neuroscientist at the Massachusetts Institute of Technology in Cambridge. But he hesitates to accept the conclusions Lynch's team has drawn. "I don't think it's been proven that these [synaptic] changes represent the memory," he says. ■

Kerri Smith



PASIEKA/SPL

Quick change: molten diamond flickers between crystal forms.

like carbon act as high-pressure cells that shrink when blasted with a beam of electrons. As they contract, the material in their centres is squeezed to very high pressures. Previous studies by Florian Banhart of the Institute for Physical Chemistry in Mainz, Germany, and Pulickel Ajayan of the Rensselaer Polytechnic Institute, New York, showed that graphite-like carbon in the onion's centre can be converted to diamond in these chambers (F. Banhart and P. M. Ajayan *Nature* 382, 433–435; 1996).

Huang's team used carbon onions with a carbon nanotube attached to the outside. They wired up the nanotube and heated the tube–onion composite while irradiating it with electrons. Huang estimates that this created temperatures of more than 2,000 °C and pressures of around 400,000 atmospheres at the core.

As the onions shrank, the carbon at the centre was transformed from graphite to diamond. When this got hot enough, it adopted the fluctuating quasi-molten state, Huang explains. Ultimately, he hopes, it will be possible to make fully molten diamond, so that the onions have liquid carbon cores.

But not everyone is confident that the diamond is really melting. Although Banhart says the new work is interesting, he thinks that the carbon may instead be switching between diamond and graphite — each time it returns to diamond, the crystals will look different, he says. ■

Philip Ball