found that a surprisingly high percentage of the particles were Saharan dust. The tiny dust particles can lead to higher droplet concentrations but smaller droplet sizes — which may make precipitation less likely. This could create a cycle whereby dust leads to drought, and drought leads to more dust.

QUANTUM PHYSICS

Beam Yb up

Science **323,** 486–489 (2009)

Real-world teleportation takes a particle's fuzzy quantum state and transposes it onto a neighbour. It's a tricky business because direct handling of quantum information can destroy it.

Steven Olmschenk of the University of Maryland, College Park, and his colleagues solve that problem using ytterbium ions (Yb^+) and a trick of the light. The researchers begin with two ions: one in a quantum state and the second, a 'blank', placed about a metre away. They stimulated each ion to release a photon and then use the photons to quantum mechanically entangle the two ions together. Several circumspect measurements then transpose the state of the original Yb^+ onto its blank partner.

The team's technique may someday allow long-distance quantum communication.

BEHAVIOUR

Marmo-what?

Am. J. Primatol. doi:10.1002/ajp.20657 (2009)

The first evidence of within-species dialects among neotropical primates has been revealed.

Stella de la Torre at the University of San Francisco Quito, Ecuador, and Charles Snowdon at the University of Wisconsin, Madison, recorded the vocal patterns of adult pygmy marmosets (*Callithrix pygmaea*; pictured right) from 14 groups found in five geographically distinct regions of northeastern Ecuador. Although variation among the calls of adults from the same region was common, they discovered consistent structural differences in calls between regions.

The authors suggest that social factors, genetic drift and habitat acoustics — with different sounds being needed to best transmit information through different forest habitats — could explain the differences.

ANIMAL ACOUSTICS

This whale goes to 11

J. Acoust. Soc. Am. doi:10.1121/1.3040028 (2009)

Killer whales (*Orcinus orca*; pictured below) are a boisterous bunch, keeping track of each other in the underwater gloom by calling. Many whales, such as those resident in Puget Sound, near Seattle, Washington, have to contend with a great deal of noise made by motorized boats.

Marla Holt of the Northwest Fisheries Science Center in Seattle and her colleagues measured the calls of Puget Sound whales with a series of omnidirectional hydrophones. The whales pumped up the amplitude by one decibel for every extra decibel of background noise. The authors speculate that the increased effort may cost more energy, and that the noise may stress the whales or even disrupt their communications.

FLIP NICKLIN/FLPA

GEOSCIENCE

Tell-tale ooze

Earth Planet. Sci. Lett. **227,** 156–165 (2009)

Ancient ooze from the bottom of the Pacific provides evidence that the deep ocean sucked up vast amounts of carbon dioxide during the last ice age, thus cooling the planet.

In making this argument, Samuel Jaccard of the Swiss Federal Institute of Technology in Zurich and his colleagues resurrected a hypothesis first proposed 20 years ago. The idea had been discounted, but the team obtained new data from trace elements locked in ice-age ooze, collected from the ocean bottom by a drillship. That evidence, along with a revised understanding of nutrient dynamics in the ocean, suggests deep Pacific waters held less oxygen and stored much more carbon dioxide than previously thought, say the researchers.

N. GORDON/NATUREPL.COM

JOURNAL CLUB

Sue Gibson
Imperial College London, UK

An organic chemist highlights an ingenious way to make radiotracers.

In diagnostic medicine, radiotracers are used to image molecules in the body by methods such as positron emission tomography. Radionuclides such as carbon-11, nitrogen-13 or fluorine-18 are incorporated into molecules normally used by the body, such as glucose, or into designer organic molecules that bind to receptor sites within the body and provide valuable information about how they function. But the short half-lives of these radionuclides — 20, 10 and 110 minutes respectively — mean that the chemical reactions used to make the tracers must be speedy.

One step that is often time-consuming is separating out synthesized radiotracers from the large quantities of unreacted precursor molecules used to ensure efficient use of the radionuclide.

A new approach to this problem has been reported that exploits fluorous solid-phase extraction, a technique that separates molecules on the basis of their fluorine content (R. Bejot *et al. Angew. Chem. Int. Edn* **48,** 586–589; 2009). Veronique Gouverneur at the University of Oxford, UK, and her team designed heavily fluorinated precursor molecules — typically containing 13–25 fluorine atoms — that release their fluorine-rich section on reaction with a radionuclide. This generates a mixture of the desired defluorinated radiotracer and undesired fluorine-rich molecules. The mixture is then passed through a bed of fluorinated silica, which retains the heavily fluorinated compounds, leaving the radiotracer to emerge free of contaminants and ready for clinical use.

Gouverneur's work opens the door to the development of a plethora of new synthetic chemistry methods and the creation of new radiotracers for use in areas including tumour imaging and neuroimaging.

Discuss this paper at **http://blogs.nature.com/nature/journalclub**