MARINE BIOLOGY

Deep-sea Methuselahs

Proc. Natl Acad. Sci. USA doi:10.1073/pnas.0810875106 (2009)

The longevity of deep-sea corals has been much debated: radiocarbon dating provides estimates of millennia, but counting growth rings gives ages of only a few hundred years. Brendan Roark at Texas A&M University in College Station, an advocate of the radiocarbon approach, now reports with his colleagues more evidence for extremely long-lived corals.

They show that, in some cases at least, the organic carbon that is acquired by the corals is 'fresh'. It is carbon rapidly transported from the surface ocean to the depths at which the corals live, rather than old sea-floor carbon in which the radioactive carbon-14 has already decayed.

The fresh diet means that the carbon-14 levels in the corals should accurately reflect their ages. On this basis the team estimates members of the black-coral genus *Leiopathes* to be 4,265 years old.

CHEMISTRY

Chemical scissors

Nature Chem. doi:10.1038/nchem.162 (2009)

A synthetic catalyst that mimics the chemical scissors at the heart of bacterial methane digestion can snap strong carbon–hydrogen bonds.

Previous attempts to copy the natural catalyst, which relies on a pair of iron atoms for its activity, produced catalysts that could only tackle relatively weak C–H bonds. The latest version, from Eckard Münck at Carnegie Mellon University in Pittsburgh and his colleagues, works thousands of times faster and breaks the toughest of C–H bonds, such as those in cyclohexane. It picks up electrons supplied by an electric current, and delivers them to the bond to prise the carbon and hydrogen atoms apart.

Although the synthetic di-iron catalyst does not match that of bacteria for speed, it goes one better by being able to break even stronger oxygen–hydrogen bonds.

CLIMATE CHANGE

Much travelled dust

Nature Geosci. doi:10.1038/ngeo474 (2009)

During the ice ages there was much more dust in the air over Antarctica than there is now, but its supply was sometimes rapidly curtailed.

David Sugden of the University of Edinburgh, UK, and his colleagues suggest that an 80,000-year record of the extent of the glaciers in Patagonia, the likely source of the dust, may explain the uneven pattern of dust deposition seen in Antarctic ice cores.

When the glaciers were extended, their sediment-rich discharge flowed out over extensive plains. Here, their dusty sediments would have been easily mobilized by the wind. When the glaciers retreated — as they did on occasion, even in an ice age — they discharged instead into lakes (pictured below), where the sediments simply accumulated. Glacier fluctuations correlate well with the Antarctic dust record.

B. HARRINGTON III/CORBIS

ECOLOGY

Saving songbirds

Ecol. Appl. **19,** 505–514 (2009)

The number of birds killed by crashing into communication towers could be reduced by about 50–70% by simply changing the towers' lighting systems, researchers say.

Millions of night-migrating songbirds collide with these towers each year. Joelle Gehring of Michigan State University in Lansing and her colleagues counted bird carcasses below 21 similar-sized towers in Michigan during two 20-day migration periods in 2005.

Towers with only flashing lights had a mean of 3.7 bird kills per season, whereas towers with both flashing and steadily burning lights had a mean of 13.

As the steady light may attract birds, the team suggests that tower operators turn off those lights or reprogram them to flash.

JOURNAL CLUB

Anthony J. Ryan
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A chemist welcomes an ingenious advance in plastics technology.

It's a rare joy to come across a communication that is truly concise, with a genuinely surprising but ultimately logical result, and compellingly modest conclusions that could materially benefit our society. Anne Hiltner at Case Western Reserve University in Cleveland, Ohio, and her colleagues take two well established facts — confined polymers form single crystals, and a blend of polymers, when stretched and folded by clever processing, makes very many thin layers — and use them to make something novel: a two-polymer blend with an oxygen permeability 100 times lower than either of its components (H. Wang *et al. Science* **323,** 757–760; 2009).

Plastics are often used in packaging as multilayer coatings. When each layer is thick, the barrier to oxygen is the sum of the properties of its components. The team found that as the layers were stretched, making them thinner, and folded back on themselves to make many layers, the plastic film became an even better oxygen barrier.

When a polymer crystallizes in a confined film it typically makes large pancake-like crystals around 10 nanometres thick and many micrometres across. Using simple mathematical models, the team showed that the improved barrier properties were due to the stretched and folded polymers forming alternating layers of such crystals. The core of each crystal is essentially impermeable to oxygen, which thus has to go across the pancake to find the edge — and at each alternate layer it faces another impermeable core: like a person having to go 1 kilometre sideways to go 1 metre forwards.

This astounding improvement is essentially free and could be incorporated into current packaging materials at little cost, reducing their environmental and energy impact. It makes a cold beer in a biodegradable plastic bottle a distinct possibility — and for me that would be a rare joy indeed!

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