

lacking many of the neurons that produce serotonin. Litters in the care of mothers with low serotonin levels died within a few days of birth despite adequate nursing.

The mothers' behaviour explained this: they built poor-quality nests and did not keep their offspring huddled together, leaving the litter exposed to the cold. When these mothers' young were fostered by normal mothers immediately after birth, their odds of living rose to normal.

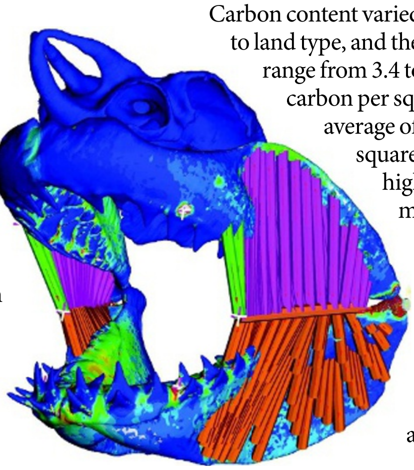
PALAEOBIOLOGY

Megabite

J. Zool. doi:10.1111/j.1469-7998.2008.00494.x (2008)

How hard can a great white bite? The shark (*Carcharodon carcharias*) can chomp with about 18,000 Newtons of downward force — the strongest known bite of any living species — and its habit of shaking its head from side to side might increase this further.

Stephen Wroe at the University of New South Wales in Sydney, Australia, and his colleagues calculated this flesh-ripping force from a three-dimensional computer model of the animal's skull, jaw and muscles (pictured right). Sharks' skeletons are made of cartilage rather than the much stiffer bone, and although this causes the jaws to undergo greater deformation, it seems to be no impediment to a powerful bite.



S. WROE ET AL.

The team estimates that the even larger extinct shark *C. megalodon*, which is thought to have hunted whales, may have bitten with an order of magnitude more force.

MATERIALS SCIENCE

Finding focus

Appl. Phys. Lett. **93,** 05311 (2008)

Physicists would like to make lenses from metamaterials — structures that can have a negative refractive index. Such lenses would tightly focus light over short distances with little or no distortion. So far, researchers have only been able to make crude versions of these lenses from aluminium oxide rods. But Didier Casse, Srinivas Sridhar and their colleagues at Northeastern University in Boston, Massachusetts, say they have built a two-dimensional metamaterials lens from a semiconductor crystal.

The lens was made by carving a lattice into a layered indium gallium arsenic phosphide wafer. It can focus infrared light of the same wavelength as that used in common devices to a spot just 12 micrometres away from its surface. The authors say that the work could lead to smaller, more efficient digital cameras and sensors.

GEOSCIENCES

Soil sink surprise

Nature Geosci. doi:10.1038/ngeo284 (2008)

It is vital to know how much carbon is stored in Earth's Arctic soils, because much of it could be released as greenhouse gases as the planet warms.

Chien-Lu Ping at the University of Alaska Fairbanks in Palmer and his colleagues dug 117 one-metre-deep pits across the North American Arctic region to gather data on this pressing problem. They combined this with 22 existing datasets from shallower holes.

Carbon content varied markedly according to land type, and the team's measurements range from 3.4 to 55.1 kilograms of carbon per square metre. Their average of 34.8 kilograms per square metre is substantially higher than previous measurements of between 20 and 29 kilograms per square metre, and suggests that current estimates of the total carbon stored in Arctic soils are too low.

ZOOLOGY

Under pressure

Curr. Biol. **18,** R695–R696 (2008)

Wind turbines are bafflingly bad for bats, the bodies of which are often found beneath their blades. Erin Baerwald and her colleagues at the University of Calgary in Canada think they know why: the pressure differential near the blades causes decompression sickness in the animals.

The team collected dead hoary bats (*Lasiurus cinereus*) and silver-haired bats (*Lasionycteris noctivagans*) at a wind facility in Alberta. During autopsy, they found that 69 of the 75 bats had suffered haemorrhaging in the chest or abdomen, even though 32 seemed to have no external injuries. The remaining six had an external injury but no evidence of internal bleeding.

Bats apparently encounter the lethal pressure change as they flit close to the turbine blades.

JOURNAL CLUB

John Harte
University of California, Berkeley

An ecologist notes that important details are missing from climate-change models.

Unmitigated climate change will gravely reduce Earth's biodiversity. How much this will happen is calculated by combining data on how the species richness of different habitats varies with their area and projections of how much various habitat types will shrink as the planet warms.

But such grand analyses are blunt instruments; they miss numerous local processes. I have seen, for example, rosy finches and ptarmigans feeding on the contracting ring of vegetation that surrounds melting snow patches on Alpine slopes. Would these creatures survive the summer if the snow patches melted in late spring rather than late summer? Formed in existing mountainside hollows, snowbeds will not march uphill as the climate warms.

This question was recently answered by Robert Björk and Ulf Molau, then both at the University of Gothenburg in Sweden. They reviewed how the release of water and nutrients from the contracting edge of lingering snow patches sustains alpine life in midsummer by providing nourishing vegetation (R. Bjork and U. Molau *Arctic Antarctic Alpine Res.* **39,** 34–43; 2007). The duo propose that bryophytes, grasses, sedges and rushes will be worst hit by the patches' earlier annual disappearance, and that these easy-to-graze species will be replaced by shrubs and trees, hitting Alpine herbivores hard.

This is just one example of the many impacts on biodiversity that fall through the cracks of current, coarse projections. Life and climate intersect on fine spatial and temporal scales — in the microclimates provided by terrestrial 'nurse plants' and in rock pools that form fleetingly in bedrock depressions. The disruption of these delicate intersections may add up to even more damage to biodiversity than the large-scale models predict. This deserves more study.

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