

RESEARCH HIGHLIGHTS

STEM CELLS

Insulin from scratch

Nature Biotechnol. doi:10.1038/nbt1393 (2008)

Researchers have used human embryonic stem cells to generate insulin-producing pancreatic cells that respond to glucose and protect against a diabetes-like condition in mice. The approach may one day be useful for treating diabetics.

Previous attempts had yielded pancreatic cells that did not respond to glucose. But Emmanuel Baetge and his co-workers at Novocell in San Diego, California, adjusted their protocol to select cells at an earlier stage of differentiation. When those pancreatic cells were grafted into mice, the cells began producing insulin within 30 days of the transplant.

Both fasting and glucose intake triggered insulin production by the transplanted cells. The cells also protected mice from diabetes caused by a toxin that selectively kills mouse insulin-producing cells.

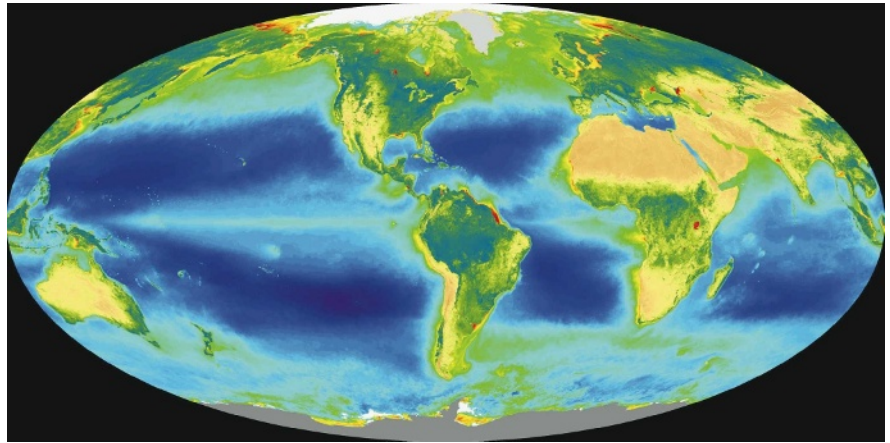
ENTOMOLOGY

Metal mouth

Naturwissenschaften doi:10.1007/s00114-008-0346-3 (2008)

The termites of the subfamily Kalotermitidae have mandibles that are harder than those found among any of their kin, according to Bronwen Cribb at the University of Queensland in Brisbane, Australia, and her colleagues.

The secret to their hardness seems to be the substantial amount of zinc in the wood that termites eat, which the Kalotermitidae alone concentrate along the edges of their mandibles (pictured below). The researchers analysed



NASA

Hue and die

Geophys. Res. Lett. **35**, L03618 (2008)

The ocean's colour from space is determined by the density of its photosynthetic life, allowing researchers to track changes in sea life over time across extensive areas.

Jeffrey Polovina of the US National Oceanic and Atmospheric Administration's Pacific Islands Fisheries Science Center in Honolulu, Hawaii,

and his co-workers looked at the colour of the least biologically productive reaches of the ocean, known as the subtropical gyres, from 1998 to 2006. They found that the most desert-like areas (darkest blue in this false-colour map) are expanding — hand in hand with rising sea surface temperature due to global climate change. Warmer waters see less vertical mixing and therefore reduced movement of nutrients from

the depths to the sunlit surface.

The work provides an update on analyses done with the same data set but over fewer years, and startles with its dire conclusions: waters containing 0.07 milligrams or less of chlorophyll per cubic metre have expanded by 6.6 million square kilometres, that is, by about 15%, in nine years. This is a much faster rate than expected from climate models.

the elemental composition of different termite species' mandibles and applied scratch tests along the mandible edges to determine just how hard they were. Previous work found that zinc reinforcement made mandibles up to 20% harder.

Most termites eat damp or moistened wood, whereas the Kalotermitidae specialize in consuming dry wood, which is tougher to chew through and is probably what drove the evolution of their extra hard bite.

SEMICONDUCTORS

Under the wave

Phys. Rev. Lett. **100**, 073602 (2008)

In the semiconductor business, the smaller the circuit that can be etched onto a microchip, the more profit a company is likely to see. The wavelength of light used to etch the chips is one of the main constraints on miniaturization.

Muhammad Suhail Zubairy at Texas A&M University's campus in Doha, Qatar, and his colleagues have found a way — in theory at least — to make smaller features.

The team's calculations show that multiple lasers can be beamed onto a surface in a

way that creates quantum interference. This interference could, in turn, be used to create sub-wavelength patterns on a chip.

GENETICS

Smoking in black and white

Hum. Mol. Genet. doi:10.1093/hmg/ddn044 (2008)

Why is kicking the habit so hard for some? A protein involved in directing neuronal wiring looks increasingly like a culprit. Ming Li at the University of Virginia in Charlottesville and his colleagues analysed 21 points of frequent variation in the gene encoding neurexin 1 in smokers of varying levels of addiction.

Their findings confirm previous gene-association studies linking neurexin 1 to susceptibility to nicotine dependence. They further suggest that the same gene associates with dependence in Americans of both European and African descent, but in different ways. Different regions of the gene link to smoking for blacks and whites.

Neurexins are cell-adhesion molecules that may help form and maintain neuronal synapses. Another neurexin, neurexin 3, has previously been linked to alcohol addiction.

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