

550 years. This is about 25% shorter than the previous value, but, they write, “still far beyond any societal time frames”.

The market for NF_3 has exploded recently, because its initial use in rocket fuel has expanded to include applications in the semiconductor industry. NF_3 is already potentially a bigger contributor to climate warming than the carbon dioxide emissions of some large coal-fired power plants, and global production in 2008 is predicted to be more than 3,500 tonnes — a number that could double by 2010. Yet NF_3 is not included in the greenhouse gases covered by the Kyoto Protocol.

ECOLOGY

Competing keeps bees busy

J. Ecol. doi:10.1111/j.1365-2745.2008.01405.x (2008) Bumblebees are pollinator generalists, flying to more flower species than most other insects, but a new study suggests that this behaviour depends on competition.

Colin Fontaine and his colleagues at the École Normale Supérieure in Paris recorded the foraging behaviour of individual common bumblebees (*Bombus terrestris*) in an experimental garden where five flowering plant species were available.

The researchers varied the number of bees present during the experiment and found that when few bees were present, they visited fewer species of plant.

Pollinator numbers are known to be falling in many regions owing to human disturbance. Worryingly, the resulting reduced competition could lead bumblebees to eschew some plant species.

GEOLOGY

Glacial speeds

Science 321, 111–113 (2008)

The movement of ice sheets increases markedly when meltwater gets involved, according to researchers from Utrecht University in the Netherlands.

Just days after increased meltwater is produced, ice velocity can increase by a factor of four, say Roderik van de Wal and his colleagues. They used 17 years' worth of data from Global Positioning System units drilled into the western edge of Greenland's ice sheet to determine both ice velocity and disappearance rates. Despite detecting larger than previously observed meltwater-induced

bursts in velocity, the team found that, in the long term, ice velocities have actually decreased slightly.

They suggest that ice sheets continually adjust to the amount of meltwater, keeping overall velocities more or less constant.

EVOLUTION

Photosynthetic ancestors

Curr. Biol. doi:10.1016/j.cub.2008.05.042 (2008) Genomic analysis of the hairy single-celled ciliate *Tetrahymena thermophila* (pictured below) suggests that ciliates may once have been photosynthetic. This finding supports the controversial ‘chromalveolate hypothesis’, which proposes a common photosynthetic ancestor for two groups of single-celled eukaryotes: the chromists and the alveolates.

Searching through the tens of thousands of proteins predicted from the genome of

T. thermophila, an alveolate, Debashish Bhattacharya and his colleagues at the University of Iowa in Iowa City identified 16 proteins potentially derived from a photosynthetic algal ancestor. All 16 were also present in another ciliate, *Paramecium tetraurelia*.

The researchers argue that it is more likely that the ciliates had a photosynthetic ancestor but later lost the ability to photosynthesize than that they absorbed the genes by horizontal gene transfer.

MOLECULAR NEUROSCIENCE

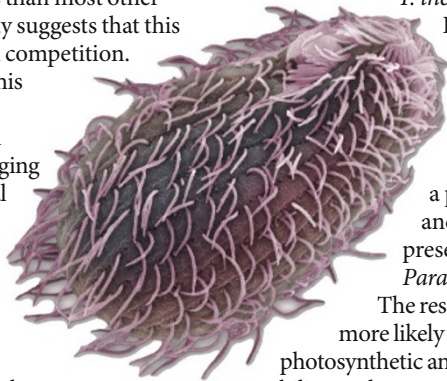
Pores for thought

Nature Neurosci. doi:10.1038/nn.2151 (2008)

Ion channels activated by ATP — the main source of energy for cells — are abundant throughout the body, and are involved in fundamental processes such as pain and inflammation. But little is known about their molecular structure.

Shai Silberberg and her colleagues at the National Institute of Neurological Disorders and Stroke in Bethesda, Maryland, now report some unusual properties of the channels. They found that the bulk of the pore of the ATP-activated channel — and the gate controlling ion flux through the pore — comprises just three transmembrane protein stretches, one from each of the channel's identical protein subunits.

The pores of families of ion channels activated by other neurotransmitters such as acetylcholine are generally much more complex.



A. BELL/VISUALS UNLIMITED/GETTY

JOURNAL CLUB

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A biologist despairs over the difficulty of demonstrating heritability of chromatin states.

Chromatin, the packaged bundles of protein and DNA that make up eukaryotic genomes, is widely believed to be a carrier of ‘epigenetic’ inheritance — that is, heritable information not encoded by DNA. In multicellular organisms, the chromatin of mother and daughter cells is generally of similar shape, exposing similar regions of DNA for expression. And chromatin regulators often seem to be required for epigenetic states to be inherited. But there is a problem. It is possible that some other information carrier is inherited, and then directs chromatin regulators to re-establish a functional state.

One purported example of chromatin inheritance comes from yeast, which seem to ‘remember’ prior growth conditions. Galactose-naïve yeast induce genes for Gal enzymes slowly; those whose recent ancestors experienced galactose induce them much faster. Because this ‘memory’ requires certain chromatin regulators, it has been suggested that it provided evidence for a heritable chromatin state.

Zacharioudakis *et al.* investigate this idea using heterokaryons, fused pairs of yeast cells that have mixed cytoplasmic contents but maintain separate nuclei. By inducing memory in one yeast and seeing speedy *GAL1* expression in the other, they show that memory of galactose is transferable through cytoplasm (I. Zacharioudakis *et al.* *Curr. Biol.* 17, 2041–2046; 2007). Thus, the chromatin state around the *GAL1* gene cannot be the heritable factor, and the authors further identify the probable inheritance factor as a soluble enzyme.

These results demonstrate the difficulty of proving that any example of epigenetic inheritance is due to inheritance of chromatin state per se. One wonders whether any chromatin state will ever be proved to be heritable, given the difficulty of proving the absence of another information carrier.

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