

## RESEARCH HIGHLIGHTS

**Wind-blown ice**

*Geophys. Res. Lett.* doi:10.1029/2009GL042356 (2010)

Arctic wind patterns explain half of the annual variation in the minimum extent of Arctic sea ice, and account for about one-third of the unexpectedly rapid sea-ice decline seen in the past three decades, researchers report.

Masayo Ogi of the Japan Agency for Marine-Earth Science and Technology in Yokohama and her colleagues compared published data on summer and winter winds from 1979 to 2009 with data on September sea-ice extent. They found that certain wind anomalies — such as the summer anticyclonic (clockwise) winds over the Beaufort Sea — correlate with low sea ice. The authors say that these winds may enhance the flow of ice out through the Fram Strait east of Greenland, contributing to ice shrinkage. Their analysis identified an increasing trend in these particular wind patterns.



P. SOUDERS/CORBIS

**MATERIALS SCIENCE****Ultrathin fibres heat up**

*Nature Nanotechnol.* doi:10.1038/nnano.2010.27 (2010)

The plastic polyethylene is used in a wide range of products, from shopping bags to water pipes. One place it doesn't appear is in heat exchangers, which dissipate heat and are essential components of devices such as refrigerators and air conditioners. That's because, in its bulk form, the plastic can conduct only a paltry amount of heat. Bulk polymers typically conduct only around 0.1 watts per metre-kelvin.

Gang Chen and his colleagues at the Massachusetts Institute of Technology in Cambridge have markedly improved that figure using thin fibres of polyethylene. They created the fibres by stretching strands of polyethylene gel with a sharp tungsten tip. The 50–500-nanometre-wide strands act as conduits, conducting heat at rates as high as 104 watts per metre-kelvin — a rate similar to that of many metals. Chen and his team believe the work could lead to low-cost plastic replacements for some metal components.

**PALAEONTOLOGY****Egg-stracting DNA**

*Proc. R. Soc. B* doi:10.1098/rspb.2009.2019 (2010)

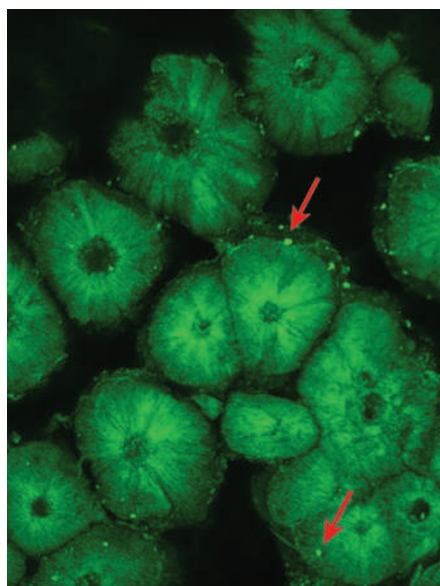
Improved techniques have yielded well-preserved DNA from fossilized eggshells, highlighting a potential new source of ancient genetic material.

Eggshells are commonly found at fossil sites, but previous attempts to pull DNA

from them have failed. Michael Bunce at Murdoch University in Perth, Western Australia, and his colleagues took several measures to optimize DNA extraction, including warming a DNA-isolation solution containing powdered eggshell to 95°C.

The authors tackled the eggs of several extinct species, including the New Zealand giant moa (*Dinornis robustus*; microscope image of eggshell's inner surface pictured). They say that their procedure released the DNA (red arrows) from the eggshell's calcium carbonate crystalline matrix, allowing them to double their yield. They also found that eggshells are less contaminated with bacterial DNA than fossil bones.

**For a longer story on this research, see [go.nature.com/lx1mzC](http://go.nature.com/lx1mzC)**

**NEUROSCIENCE****Rats on the wagon**

*Neuron* 65, 682–694 (2010)

Rats that regularly consume alcohol and are then denied it show increased activity in a specific brain region.

F. Woodward Hopf, at the University of California, San Francisco, and his colleagues gave rats access to either a 10% alcohol solution or sucrose for several weeks and then cut them off. After a few weeks of abstinence, the alcohol-exposed rats had increased neuronal firing in the core of the nucleus accumbens — a brain structure associated with motivation and addiction — but those that had consumed sucrose did not.

This elevated activity is linked to reduced numbers of a certain type of potassium channel that normally depresses neuronal firing. Alcohol-drinking rats that were given a drug to activate these channels — thus dampening firing in this brain region — were less likely to seek alcohol. Drugs that activate the channels in humans might prevent relapse to alcoholism, the authors say.

**VIROLOGY****Infectious inheritance**

*Proc. Natl Acad. Sci. USA* doi:10.1073/pnas.0913586107 (2010)

The genome of a common herpesvirus may hitchhike from one generation to the next on the ends of human chromosomes, and reawaken in an infectious form.

Human herpesvirus-6 infects almost everyone. Peter Medveczky of the University

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of South Florida in Tampa and his colleagues studied four families in which some members had unusually high amounts of herpesvirus-6 DNA in their blood. The researchers found that the viral genome had inserted into caps called telomeres at the ends of chromosomes.

The viral genomes in parents and their children were identical, suggesting that the DNA is heritable. Treating cells from these families with compounds that stimulate latent herpesviruses also allowed the viruses to infect other cells in culture.

### CONSERVATION

## Heavy metal history

*Environ. Sci. Technol.* doi:10.1021/es903176w (2010) Endangered California condors (*Gymnogyps californianus*; pictured) are heavily affected by lead poisoning, but current biannual testing detects only a fraction of their exposure.

Myra Finkelstein at the University of California, Santa Cruz, and her colleagues report that analysis of sequential segments of condor feathers can provide a history of lead exposure over the 2–4 months of feather growth.

By measuring lead concentration and isotope composition in feather and blood samples, the researchers identified lead-exposure events that would have been missed by blood monitoring alone. Their technique, they say, may also be applicable to other bird species.



ALL CANADA PHOTOS/ALAMY

### ARCHAEOLOGY

## Adoption or migration?

*J. Archaeol. Sci.* 37, 866–870 (2010)

The origin of farming in Britain is hotly debated: did the indigenous population adopt farming practices through trade and exchange with continental Europe or did migrants bring farming from the mainland?

Mark Collard from Canada's Simon Fraser University in Burnaby, British Columbia, and his colleagues used radiocarbon dates to estimate prehistoric population changes in Britain. They found that about 6,000 years ago, population density increased sharply and cultivated plants occurred at around this time.

The best explanation for this is that groups of migrant farmers from mainland Europe established colonies in England and

Scotland. Farming would have supported higher population densities than hunting and gathering. And if the indigenous hunter-gatherers had adopted farming from the mainland, they would have taken longer to learn it, resulting in a slower growth in population than is indicated by the data.

### NEUROSCIENCE

## Memory reading

*Curr. Biol.* doi:10.1016/j.cub.2010.01.053 (2010)

By decoding patterns of brain activity, researchers can tell which in a list of events a person is recalling.

Eleanor Maguire and her colleagues at University College London, UK, showed ten volunteers short films depicting three different actions such as drinking coffee. The researchers then asked them to

remember each action individually while scanning their brains using functional magnetic resonance imaging (fMRI). They found that unique fMRI patterns in the hippocampus corresponded with the recall of specific memories.

These patterns were stable over 24 hours and allowed the scientists to predict

which memory participants chose to recall.

### GENOMICS

## We are family

*Science* doi:10.1126/science.1186802 (2010)

The human mutation rate is lower than previously thought, according to researchers who sequenced the entire genomes of four family members — two siblings with rare genetic disorders, and their parents.

David Galas and Leroy Hood at the Institute for Systems Biology in Seattle, Washington, and their colleagues estimate that roughly 70 new mutations arise per genome between generations. This is lower than earlier estimates based on genomic comparisons between humans and their closest living relatives, chimpanzees.

The team also pinpointed four genes likely to underlie the siblings' two disorders — Miller syndrome and primary ciliary dyskinesia. The four genes are a subset of those reported in previous studies.

**For a longer story on this research, see [go.nature.com/Owe9CD](http://go.nature.com/Owe9CD)**

## JOURNAL CLUB

**Eran Segal**  
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### A computational biologist looks at how identical cells come to differ.

My main interest is in understanding how complex biological behaviours are encoded by DNA. An example of such behaviour is the ability of genetically identical cells to generate diversity in their phenotypes, or observable traits, by changing how genes are expressed from one cell to the next. How expression variability occurs over short timescales (for example, during a cell cycle) has been well studied; much less is known about it over longer timescales.

So I was excited by work from Narendra Maheshri of the Massachusetts Institute of Technology in Cambridge and his colleagues. They demonstrate that slow expression fluctuations of a yeast gene are regulated locally, or in *cis*, by that gene's promoter — a nearby stretch of DNA that regulates the gene's expression (L. M. Octavio *et al.* *PLoS Genet.* 5, e1000673; 2009).

They studied the yeast protein FLO11, placing two copies of the protein's promoter in the same cell, each in front of an engineered fluorescent 'reporter' gene. The reporters switched expression slowly and independently, implying that the expression fluctuations were locally encoded. The authors further identified global, or *trans*, regulators that affect the fast and slow expression fluctuations of FLO11. The type of expression effect that a regulator exerts seems to depend on several factors, including the location of the regulator relative to the site at which transcription, or reading of the DNA, begins, and relative to sites for other regulators.

Although the mechanistic details of this encoding are still unclear, applying similar approaches to many more promoters should bring us closer to understanding how other complex phenomena are encoded by DNA. This will hopefully allow us to one day predict the phenotypic effects of human genetic variation.

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