

the effects of two drugs. The first, called GW1516, boosts activity of the gene that encodes PPAR $\delta$ , a protein involved in metabolism, and, when combined with exercise training, allowed mice to run up to 70% farther than untreated mice.

The researchers then dosed mice with the second drug, AICAR, which acts on an enzyme known as AMPK that is normally activated by exercise. Even though the mice did not undergo exercise training, AICAR boosted their endurance by 44% and remodelled their physiological and genetic characteristics in ways similar to exercise.

## ANIMAL BEHAVIOUR

### Love song

*Behav. Ecol. Sociobiol.* **62**, 1633–1641 (2008)

Most male birds sing to attract females, but some species have puzzled ornithologists by continuing to sing long after egg laying.

Valentin Amrhein and his colleagues at the University of Oslo compared blue tits (*Cyanistes caeruleus*) and great tits (*Parus major*). Both live in the same places and have similar reproductive behaviour. They differ in that the monogamous great tits often raise second broods; blue tits seldom do.

The team found that great tits carried on singing after egg laying, whereas blue tits reduced singing. They argue that great tits sing both to continue defending their territory and to encourage females to lay a second clutch.

## CELL BIOLOGY

### Starve and reproduce

*Aging Cell* doi: 10.1111/j.1474-9726.2008.00409.x (2008)

Mice that spend much of their adult lives on a restricted diet lengthen their fertile lifespan, a new study suggests.

Previous studies have shown that caloric restriction from birth can extend fertility, but can also adversely affect development. A team led by Jonathan Tilly at Massachusetts General Hospital in Boston cut animals' calorie intakes by 40% between 4 and 15.5 months of age — roughly equivalent to a human's mid-20s to mid-40s.

When returned to a normal diet, these mice continued to have young for several months beyond the time that they would normally stop reproducing. Moreover, many more of the offspring survived than did those born to control mice during the normal fertile period.

The work supports the idea that drugs mimicking caloric restriction might delay human menopause.

## NEUROBIOLOGY

### Baby blues

*Neuron* **59**, 207–213 (2008)

Levels of neurosteroids derived from the hormone progesterone fluctuate during the menstrual cycle and soar during pregnancy. But abnormal levels are associated with disorders such as premenstrual dysphoric syndrome and postpartum depression.

Neurosteroids act through the GABA<sub>A</sub> receptor to modulate excitability of brain cells. Using genetically modified mice that lack the delta subunit of the GABA<sub>A</sub> receptor, Istvan Mody and Jamie Maguire at the University of California, Los Angeles, found that females showed depressive and anxious behaviours after giving birth, and did not care properly for their pups.

Failure to regulate GABA<sub>A</sub> receptors as

neurosteroid levels plummet after giving birth may similarly underlie human postpartum depression.

## GEOLOGY

### The end of flat Earth

*Geology* **36**, 635–638 (2008)

Dramatic mountains couldn't appear on Earth until its outer shell was strong enough to sustain them. New findings indicate this may have occurred during the Neoproterozoic era, between 2.8 billion and 2.5 billion years ago.



Numerical simulations run by Patrice Rey at the University of Sydney in Australia and Nicolas Coltice at the University of Lyon in France suggest that only in the Neoproterozoic did the Earth cool enough for its lithosphere to strengthen. That, in turn, allowed the crust to thicken and be uplifted to heights greater than 2,500 metres for the first time.

Newly rising mountains would have also meant more high elevations at which erosion could occur, which would have altered the geochemical links between planet and atmosphere.

P. BOURSEILLER/GETTY

## JOURNAL CLUB

**Benny Freeman**  
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**A chemical engineer notes that not all membrane pores are made equal; some are more equal than others.**

Few cheap, man-made membranes have holes of uniform size. This makes them either inefficient or unreliable sieves of particles such as viruses. But membranes are also one of the least energy-intensive separation devices. As fuel costs rise, many of the billion or so people

without access to safe drinking water find it harder to sanitize what water they have. This is why I view the low-cost manufacture of isoporous membranes as a holy grail in the field.

Recently, some scientists in Germany unearthed a path to this chalice by tinkering with a technique known as 'phase inversion'. This is often used to make synthetic membranes: a polymer solution is immersed in a liquid, often water, which diffuses into the solution and causes a thin, porous membrane of hydrophobic polymer to form. The solid polymer

is a twisted, irregular matrix, full of odd-shaped pores.

Klaus-Viktor Peinemann and his co-workers started with a polymer in which the chain-like molecules have a hydrophobic and a hydrophilic end, and allowed the solvent solution to evaporate. As this happened, they think that the polymer assembled into connected cylinders, with the hydrophobic and hydrophilic parts of different molecules coming together. The researchers then plunged this nascent membrane into water, which moved through the hydrophilic cylinders, opening

them up and thus creating identical and aligned pores (K.-V. Peinemann *et al. Nature Mater.* **6**, 992–996; 2007).

The pores were all about 10 nanometres wide — roughly the right size to separate hepatitis B virus from water. Picking other polymers with hydrophobic and hydrophilic parts should allow the development of membranes with uniform-diameter pores of various sizes. That could be a boon for industry as well as public health.

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