Vision

Sea gypsies see shells on the sea floor

Curr. Biol. **13,** 833–836 (2003)

Under water, most of us are half-blind — but not so the Moken. This Southeast Asian tribe of sea gypsies can see under water twice as clearly as Europeans, according to Anna Gislén and colleagues.

The semi-nomadic Moken, who live among the Surin Islands off Thailand's west coast, use their superior visual skills to dive for food on the ocean floor. Most of us see blurred images when we dive without goggles or a mask, as our eyes struggle to bend and focus light under water. But Moken children can pick out small shells, clams and sea cucumbers at depths of 3 to 4 metres.

Gislén *et al.* have now compared the sub-aqua vision of native Moken and holidaying European children. Immersed in the clear, shallow waters of the Ko Surin National Park, the Moken children were able to distinguish underwater objects less than 1.5 millimetres wide. Europeans struggled to make out anything less than 3 millimetres across.

The authors found that, unlike the visitors, the Moken swimmers constrict their pupils while diving. The researchers also speculate that the Moken can squeeze the lenses of their eyes more, making them thicker and better able to bend incoming light. Together, the two processes bring blurry images into sharper focus, pushing the eyes' optics to the limit of what may be humanly possible. **Helen R. Pilcher**

Biogeochemistry

Heavy metal out of air

Atmos. Environ. **37,** 1613–1622 (2003)

Do deciduous trees simply recycle mercury in the environment by taking it up from the soil and then returning it when the leaves drop off in autumn? Or do leaves capture gaseous mercury from the atmosphere, and when they fall add to the local soil concentrations?

J. A. Ericksen and colleagues investigated these questions in a two-year study of quaking aspen trees (*Populus tremuloides*), grown under highly controlled conditions. They conclude that almost all of the mercury in leaf tissue comes from the atmosphere, and that its passage through foliage into the terrestrial environment probably constitutes a significant sink for the element.

Mercury is a serious pollutant, and there is a lot of it about. Earlier this year, the United Nations Environment Programme estimated that emissions have tripled since pre-industrial times, and that some 2,000 tonnes are released annually from coal-burning power stations and mining operations (in which mercury is used in precious-metal extraction).

The methylated form of the element is especially nasty. In provisional results, Ericksen *et al.* find that the amount of methylmercury in foliage decreases with leaf age. But how mercury is transformed during its passage from atmosphere to plant to soil and beyond remains largely unknown. **Tim Lincoln**

Microbiology

Flab control

Dev. Cell **4,** 663–672 (2003)

Fat does have its uses. Lipids are an essential component of cell membranes and a source of regulators of metabolism and energy. Their production is complex and tightly regulated, so each membrane can be tailored to suit the needs of the cell, the tissue and the organism. Gustavo E. Schujman and colleagues have now found a molecular switch that controls lipid biosynthesis in the bacterium *Bacillus subtilis*.

Schujman *et al.* discovered that one *B. subtilis* protein, encoded by the *fapR* gene, could bind to and repress several clusters of genes involved in the production of fatty acids. Deleting the *fapR* gene turned on all these 'fat-production genes' at once. This slowed down the growth of the bacterium and also made it less resistant to cold — probably because of alterations in the lipid composition of its membrane.

In *B. subtilis* that did carry *fapR*, however, the fat-production genes could be switched on by inhibiting fatty-acid biosynthesis. So, the FapR protein seems able to gauge the amount of fatty-acid synthesis required. When fatty-acid levels fall below the norm, FapR relieves the fat-production genes from repression. And, the authors propose, it may be the build-up of biosynthetic intermediates that removes FapR from these genes, and kick-starts the fatty-acid production cycle. **Marie-Thérèse Heemels**

Behavioural ecology

Fresh with the tang of citrus

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Seabird colonies usually smell rank. But the crested auklet (*Aethia cristatella*, pictured) adds a more pleasant note to the guano — the scent of tangerines. Julie C. Hagelin and co-workers say their research shows that these are the first birds found to use smell as a social signal.

It's not yet clear what that signal means. Hagelin *et al.* speculate that it could be an olfactory ornament: perhaps only well-fed birds can produce lots of citrussy perfume, showing themselves to be good mates.

I. L. JONES

Crested auklets — signalling with scent.

Males and females are equally pungent, and monogamous. Both sexes are picky about who they mate with.

The birds live in large colonies on the coast of Alaska. Given a choice between their citrus smell, on either feathers or chemical-soaked cotton wool, and an animal odour or a bland control, Hagelin and colleagues found that auklets spent much more time investigating their signature scent. When two auklets meet, they bury their bills in the feathers around each other's necks, where the smelliest feathers are found.

Birds have a perfectly good sense of smell, which they use in finding food and navigating. The apparent absence of odour signals has been a puzzle, but researchers may now be prompted to sniff out more avian chemical messages. **John Whitfield**

Fluid dynamics

How to crack a liquid

Phys. Rev. Lett. **90,** 184501 (2003)

Dribble water from a hose into a swimming pool, and the liquid mixes smoothly. Turn up the flow to make a jet, and the impact creates bubbles. Why the change, ask Élise Lorenceau and colleagues? That question can be important in industrial processes such as pouring liquids into moulds, where bubbling creates flaws in the cast objects.

Lorenceau *et al.* study the problem using a cylinder rotating horizontally at the interface between a dense fluid (silicone oil, glyercol) and a lighter fluid (usually, in fact, air). A film of the dense fluid coats the cylinder surface, is carried around through the air, and is pushed down, like a jet, back into the body of dense fluid. This creates a cusp-like indentation of air along the downward-moving edge.

When does this cusp break up to cause entrainment of air? Theory and experiment show that the cusp's tip gets sharper as the rotation velocity increases. At some critical speed, the cusp becomes unstable: the denser fluid 'fractures', and air is pulled down in a narrow film, which eventually breaks up into bubbles. This critical velocity depends mainly on the viscosity of the denser fluid, but also on that of the lighter one. **Philip Ball**