Huntington's disease

Between genes and environment

Proc. Natl Acad. Sci. USA **101,** 3498–3503 (2004)

The fatal, inherited neurodegenerative disorder called Huntington's disease is caused by a three-base stutter in the DNA of the gene concerned. To a large extent, the length of the repeated section determines when the disease will strike. But there's the question of why people with identical repeats nonetheless succumb at different ages.

To answer this, Nancy S. Wexler and colleagues analysed the gene in 443 Venezuelans who suffer from the disease and are part of a much larger affected kindred. A statistical analysis confirmed that 72% of the variation in age of onset is caused by differences in the mutation itself.

Of the remaining variation in age of onset, 40% is determined by other 'modifier' genes that, for example, interact with the Huntington's disease gene or work in the brain cells that it destroys. The other 60% is determined by environmental influences such as diet, sanitation or exposure to pollutants.

One aim of continuing research is to try to identify the modifier genes and, potentially, drugs that might stall the onset or progression of the disease. Another is to pin down the most serious environmental risk factors, given the possibility that people who are susceptible to Huntington's disease might be able to minimize their exposure to such factors. **Helen Pearson**

Planetary science

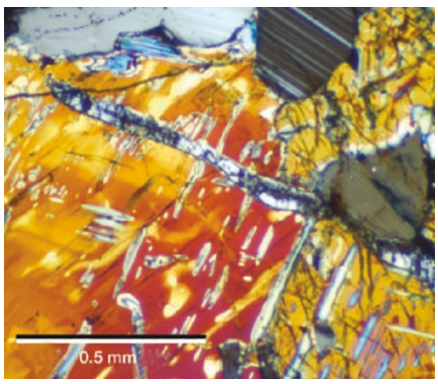
Marooned on Vesta

Earth Planet. Sci. Lett. **219,** 189–199 (2004)

Allan H. Treiman and colleagues have found veins of quartz in the Serra de Magé meteorite — evidence, they say, of ancient water on its parent asteroid Vesta.

Vesta lies in the main asteroid belt, between Mars and Jupiter. The rock of the Serra de Magé meteorite is about 4.55 billion years old, but was changed by metamorphic activity about 4.4 billion years ago, while the meteorite was still part of its parent asteroid; the quartz veins formed at some time in between. The most likely explanation of their origin is that water carried free silica into cracks in the surrounding rock, where it was eventually transformed into quartz.

As there is no evidence that the water was originally part of Vesta, it must have arrived there sometime after the asteroid formed, but before the metamorphic activity began. Treiman *et al.* speculate that a comet might have delivered this water to Vesta, and that the asteroid may still carry polar ice deposits left by this collision. **Mark Peplow**



A. H. TREIMAN *ET AL.*

The Serra de Magé meteorite, seen here through crossed polarizers. A narrow, blueish vein of quartz runs from top left to lower right.

Thermal physics

Balloon tricks

Phys. Rev. E (in the press); preprint at http://arXiv.org/abs/cond-mat/0403171

Most of us can predict what happens when two inflated rubber balloons — one large, one small — are connected by a hose: air will flow from the larger balloon into the smaller one until they are the same size. This seems obvious, and yet Yan Levin and Fernando L. da Silveira have found that air can flow in the opposite direction.

The laws of thermodynamics tell us that a pressure difference between the balloons will drive air into the balloon with the lower pressure. But which balloon is which? This is determined by the surface tension of the balloons. In elastic objects, deformation reduces disorder (entropy), but nature prefers to maximize it. By calculating the surface tension of each balloon, the authors find that either balloon can have the higher pressure, depending on the combination of balloon-rubber elasticity and balloon size, so that air from the smaller balloon can indeed fill the larger one. **May Chiao**

Plant physiology

How leaves stay dry

Langmuir doi:10.1021/la034961d (2004)

The waxy leaves of the lotus (*Nelumbo nucifera*) look smooth macroscopically, whereas plants such as *Alchemilla vulgaris*, also known as lady's mantle, have hairy leaves. Yet the surface of both remains dry after rain or morning dew.

It seems that plants have two distinct strategies for keeping their leaf surfaces dry, but the mechanisms involved are not fully understood. So physicists Alexander Otten and Stephan Herminghaus set out to do a more detailed study of Indian cress (*Tropaeolum majus*), which has smooth leaves like the lotus, and lady's mantle, using techniques such as scanning electron microscopy.

The surface of Indian cress leaves are pitted with wax crystals, each a few micrometres long. This gives the leaf a roughness that traps pockets of air beneath the liquid, which the authors say is crucial for keeping the water droplets in tight spheres and makes them run off easily.

A. OTTEN

Conversely, the hairs on the leaves of lady's mantle are very hydrophilic. Small droplets form on the leaf's surface during dew condensation, but as soon as the hairs make contact with the water they clump together into bundles that stick into the droplet. The hydrophilic hairs might be expected to behave like blotting paper, but instead, their elasticity, coupled with the droplet's surface tension, creates a force that lifts the droplet away from the leaf's surface. **Mark Peplow**

Tumour biology

Cut-off for blood supplies

Cancer Res. **64,** 1570–1574 (2004)

Cyclophosphamide is an anticancer drug that can also shrink tumours by targeting their blood supply when given at lower but frequent doses. The molecule prompts endothelial cells — the cells that line blood vessels — to commit suicide, but its mechanism of action is unclear.

When tumour cells are treated with low doses of cyclophosphamide (LDC), the levels of a naturally occurring protein, thrombospondin-1, go up, report Yuki Hamano and colleagues. Thrombospondin-1 is anti-angiogenic — that is, it inhibits blood-vessel formation — so it may help to mediate the effects of LDC. Hamano *et al.* also show that LDC suppresses tumour growth in normal mice, but works less well in mice that lack thrombospondin-1. The effects seem to be specific to this protein, because mice lacking other natural anti-angiogenic agents, such as tumstatin and endostatin, respond well to LDC.

Given the implication that LDC will be most effective against tumours that produce thrombospondin-1, the authors say that assaying levels of thrombospondin-1 in biopsy samples could be used to help structure appropriate treatments. **Helen R. Pilcher**