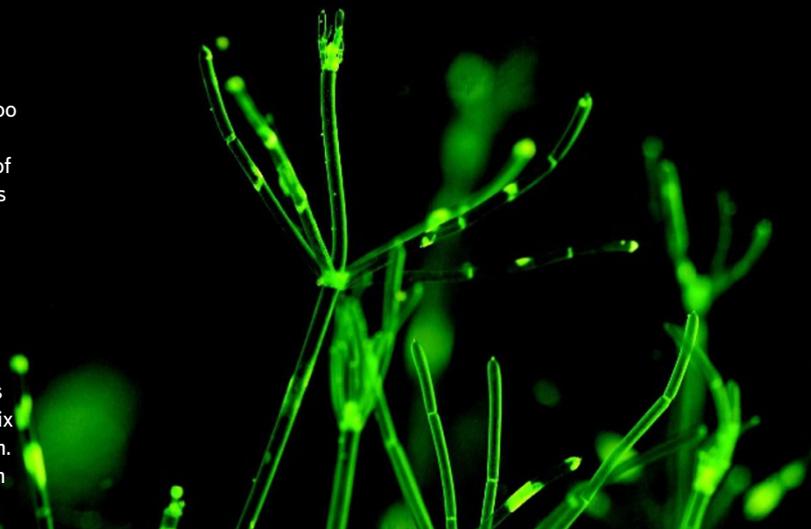


RESEARCH HIGHLIGHTS

Turn of the screw*Phys. Rev. Lett.* **101**, 178102 (2008)

The tubular cells of the aquatic plant *Chara corallina* are several centimetres long and about 1 millimetre wide — too big for diffusion to effectively disperse nutrients within them, but too small for the pumping circulatory systems of large organisms. So the cytoplasm of such a cell circulates by advection. This is driven by the movement of myosin motor proteins along 'tracks' of the filamentous protein actin on the cell's inner walls. But the details of how this works have been unclear.

Jan-Willem van de Meent and his colleagues at the University of Cambridge, UK, now present a model in which advection by the myosin 'conveyor belts' generates two counterflowing, helically entwined vortices. These mix and homogenize solutes much faster than would diffusion. The idea could be copied in microfluidic systems, in which generating rapid mixing is difficult.



J.-W. VAN DE MEENT, M. POLIN, R. E. GOLDSTEIN/UNIV. CAMBRIDGE

ZOOLOGY**Hot and bothered***Proc. Natl Acad. Sci. USA* doi:10.1073/pnas.0806830105 (2008)

Like many spiders, *Erigone atra*, which tends to live among crops, has a choice to make when it decides to move. It can either spin a silk sail to 'balloon' a relatively long way, or spin a rope and rappel a shorter distance.

A team led by Dries Bonte of Ghent University in Belgium has discovered that the temperature that *E. atra* experiences during development influences the means of transport it chooses. The researchers raised 520 spiders in Petri dishes and then placed them on platforms in a wind tunnel. Spiders raised under cool, spring-like conditions tended to balloon, whereas those raised in summer-like conditions preferred to rappel.

MOLECULAR BIOLOGY**Stemming senescence***Cell* **135**, 227–239 (2008)

Researchers have uncovered a biochemical pathway involving tumour suppressor proteins that changes the expression of genes in neural stem cells as the cells age. This casts the ebbing regenerative capacity of ageing tissues as a trade-off that keeps cancer at bay.

Sean Morrison at the University of Michigan in Ann Arbor and his colleagues worked out that the decrease in Hmga2, a regulator of gene expression, that occurs as neural stem cells age allows levels of the tumour suppressors p16^{Ink4a} and p19^{Arf} to increase. This leads to lower self-renewal rates. The researchers counted the number of neural cells per section of intestine (pictured right)

as one measure of self-renewal.

Hmga2 promotes cell renewal in young mice by maintaining low tumour suppressor levels. In old mice, however, avoiding cancer takes precedence over keeping neural matter youthful.

CHEMICAL BIOLOGY**NO problem***Nature Chem. Biol.* doi:10.1038/nchembio.115 (2008)

Nitric oxide (NO) is involved in a host of mammalian signalling pathways, and several enzymes are charged with its synthesis. The overactivity of iNOS, one of these enzymes, has been linked to multiple sclerosis and Alzheimer's disease. Now researchers have found a way to inhibit it.

Elsa Garcin and Elizabeth Getzoff at the Scripps Research Institute in La Jolla, California, and their colleagues reasoned that the best approach to selectively block the

action of this enzyme would be to study the structures of two drugs that preferentially hinder iNOS over other NO-producing enzymes. They then designed a new iNOS inhibitor that anchors itself to a binding pocket on the enzyme before inducing a cascade of conformational changes that make the inhibitor's grip more secure.

CONDENSED-MATTER PHYSICS**Sound trap***Nature Phys.* doi:10.1038/nphys1101 (2008)

Since the 1950s, physicists have known that a very disordered material can trap electrons. This is because of the electron's wave behaviour. When the degree of disorder is sufficient, the electron waves can become 'localized' in a single spot.

This trapping behaviour is complex, but John Page at the University of Manitoba in Winnipeg, Canada, and his colleagues have created an analogous but simpler system for sound waves. They fused small aluminium ball-bearings together and, using ultrasound, were able to observe sound waves become trapped in the disordered aluminium structures. They believe that their work may improve the understanding of localization, which could have applications in electronics.

ZOOLOGY**Born to reign***Science* **322**, 552 (2008)

Harvester ants develop into queens or sterile workers according to their genes as well as their environment, which had been thought to be the lone determinant of female caste.

Tanja Schwander, currently at Simon

