RESEARCH HIGHLIGHTS

Selections from the scientific literature

CELL BIOLOGY

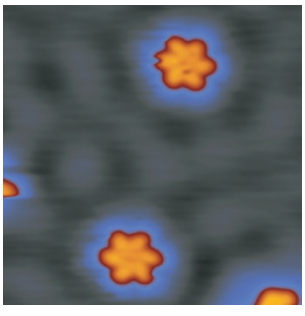
Repairing cells' disposal system

Rare genetic disorders such as Pompe disease result from the functional failure of lysosomes. These cellular organelles break down and recycle unwanted molecules, then fuse with the cell membrane to expel their contents. When the process fails, waste accumulates in cells.

Andrea Ballabio at the Telethon Institute of Genetics and Medicine in Naples, Italy, and his colleagues report that the TFEB protein that regulates lysosomes' formation and function also regulates lysosomal dumping. Moreover, overexpressing this protein reverses some of the pathologies associated with lysosomal storage diseases.

The authors boosted TFEB expression in human cells and observed them with electron microscopy. More lysosomes clustered at the cell membrane, and levels of calcium ions — needed for the organelles to fuse with the membrane — were higher than normal.

In cellular models of lysosomal diseases, overexpressing TFEB enhanced the organelles' ability to clear waste products and the cells regained their normal morphology. Delivering the *Tfeb* gene to mouse models decreased signs of cell death.
Dev. Cell **http://dx.doi.org/10.1016/j.devcel.2011.07.016 (2011)**



X. FONT/PHOTOLIBRARY

PLANT BIOLOGY

Enduring herb improves with age

The diminutive herb *Borderea pyrenaica*, a resident of the rocky slopes of the central Pyrenees, can live for at least 260 years without showing its age.

The evolutionary forces that promote age-related decline — which seems to occur in some species but not others — remain unclear. Johan Ehrlén of Stockholm University and his colleagues followed more than 700 individual *B. pyrenaica* plants (pictured) distributed over two plots for five years. The team measured size, growth, fecundity and survival. The herb gains a scar on its tuber each year, which allowed the researchers to easily determine the age of each individual at the end of the experiment.

None of the parameters studied declined with age — in fact, the older the plants got, the greater their reproductive potential became.
J. Ecol. **http://dx.doi.org//10.1111/j.1365-2745.2011.01871.x (2011)**

NANOTECHNOLOGY

Zap a molecule, make it spin

In the first demonstration of an electrically driven molecular motor, an electric current spins a single molecule like a pinwheel.

Charles Sykes and his colleagues at Tufts University in Medford, Massachusetts, used a scanning tunnelling microscope to capture images of the molecule, butyl methyl sulphide, as it spun on a copper surface (**pictured**). The microscope also supplied the current to power the motion.

The molecule had a small preference for clockwise rotation in one experimental set-up. This shows that it could be used as a motor, rather than just a rotor, in molecular machines, the researchers say.
Nature Nanotechnol. **http://dx.doi.org/10.1038/nnano.2011.142 (2011)**

MICROBIOLOGY

Diet dictates gut bacteria

People who eat plenty of protein and animal fats have predominantly *Bacteroides* bacteria in their guts, whereas in the intestines of those who consume more carbohydrates *Prevotella* species dominate.

Gary Wu at the University of Pennsylvania in Philadelphia and his colleagues recorded the dietary habits of 98 healthy people and catalogued their gut microbiomes by sequencing a specific stretch of bacterial DNA that can be used to identify and classify bacterial species. Putting ten individuals on a controlled diet for ten days did not alter their dominant gut bacteria, despite minor species changes occurring within the first 24 hours. This suggests that long-term diet is strongly associated with gut-microbiome composition.

The authors think that long-term dietary changes might aid in the treatment of conditions such as obesity and diabetes, which may be linked to the balance of gut bacteria.
Science **http://dx.doi.org/10.1126/science.1208344 (2011)**