

# RESEARCH HIGHLIGHTS

Selections from the  
scientific literature

## PROTEINS

### Antifreeze protein has a heart of ice

A molecule that prevents the blood of winter flounder (*Pseudopleuronectes americanus*) from freezing is the first protein discovered to have a water-filled core.

Peter Davies of Queen's University in Kingston, Canada, and colleagues crystallized a protein called Maxi, which binds ice crystals to prevent larger ice structures from forming. Unlike most proteins, which have hydrophobic inner surfaces that exclude water, the researchers found that Maxi's core is full of water.

The inner surface of each Maxi protein holds about 400 water molecules in ordered structures layered between the protein's chains. This water structure sticks outside the protein, where it appears to bind to ice.

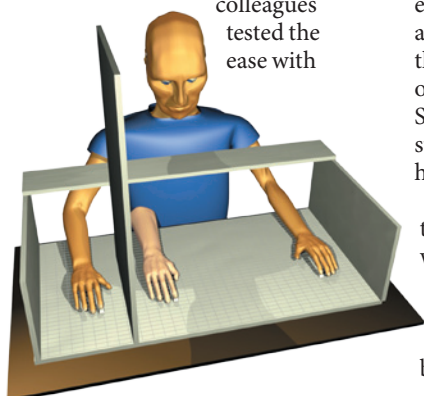
*Science* 343, 795–798 (2014)

## NEUROLOGY

### Implications of a gentle caress

Soft, slow stroking of the skin contributes more to a sense of body ownership than other types of touch.

Haike van Stralen at Utrecht University in the Netherlands and her colleagues tested the ease with



which study participants could be deceived into feeling that a rubber hand was part of their own body. Volunteers watched the fake hand being stroked quickly or slowly by either a cosmetic brush or a rough plastic cloth, while their real hand was touched out of sight (**pictured**). Soft, slower stroking gave a stronger illusion that the fake hand was their own.

The authors propose that the C tactile nerve fibres, which are activated by soft stroking of limbs at around 3 centimetres per second, may modulate how the brain integrates information

about the body's limbs from different senses (such as sight and touch).

*Cognition* 131, 147–158 (2014)

## REGENERATIVE MEDICINE

### Stem cells make muscles stronger

Manipulating muscle stem cells in older people could promote regeneration and prevent muscle breakdown.

Bradley Olwin at the University of Colorado Boulder and his colleagues demonstrated that a protein called p38 prevents stem cells in old muscles from renewing.

When the authors took muscle stem cells from old mice and treated the cells with drugs to suppress p38, this allowed the stem cells to respond to growth signals and to replicate themselves.

In a separate study, Helen Blau and her colleagues at Stanford University in California grew old muscle stem cells on a gel while treating them with p38 inhibitors. The researchers then transplanted the stem cells into the muscles of living old mice, in which they began repairing the degenerating muscle tissue. When the group tested these muscles, they



## ATMOSPHERE

### Turbines shoot upside-down lightning

Wind turbines emit lightning flashes upwards, producing these electrical discharges at regular intervals relative to the turbine's rotation, and can do so tens of kilometres away from an active thunderstorm area.

Joan Montanyà at the Polytechnic University of Catalonia in Terrassa, Spain, and his colleagues plotted radio emissions from lightning strikes detected by a mapping array system installed on the east coast of Spain.

Later, a high-speed video was used to capture the flashes (**pictured**). The authors found that turbine blades send electrical discharges upwards in synchronization with their rotation; these discharge episodes lasted for more than an hour under certain storm conditions. The results confirm that rotating wind turbines can initiate lightning more easily than static objects, the authors say.

*J. Geophys. Res. Atmos.* <http://doi.org/rfj> (2014)

JOAN MONTANYÀ ET AL./AGU

RODERIK VAN HEIJST/ELSEVIER