

## Neurobiology

## Whiskered to perfection by serotonin

*Neuron* **39**, 343–352 (2003)

Rodents can explore their world via their whiskers — specialized hairs that vibrate rhythmically and feed sensory information to the brain. A group of cells found in the brain stem is thought to act as a pacemaker that stimulates specific facial motor neurons to generate whisker movements. Alexis Hattox *et al.* now show that pacemaker cells use the neurotransmitter serotonin (5-HT) to communicate with the ‘whisking’ motor neurons.

The authors found that when whisking motor neurons were treated with 5-HT *in vitro*, they showed rhythmic, repetitive bursts of activity. And when the authors stimulated serotonin-releasing neurons that are thought to be part of the pacemaker *in vivo*, rats moved their whiskers. The neurotransmitter appears to bind to and activate specialized subsets of 5-HT receptor on the whisking motor neurons: cells treated with compounds that block the 5-HT<sub>2</sub> or 5-HT<sub>3</sub> receptor types were unable to fire. Moreover, rats treated with 5-HT inhibitors, and allowed to roam around, seemed to have lost their natural whisker rhythm.

Hattox *et al.* conclude that a group of serotonin-releasing cells in the brain stem regulates rhythmic whisking. These cells may in turn receive input from the cerebral cortex, forming a complex neuronal circuit.

Helen R. Pilcher

## Cosmology

## Support for dark energy

Preprint at <<http://arxiv.org/astro-ph/0307335>> (2003)

The existence of dark energy — the origin of the repulsion causing the expansion of the Universe to accelerate — has so far hinged on the observation of dimmer-than-expected distant supernovae. But Ryan Scranton *et al.* have now found independent and more direct evidence. They show that the cosmic microwave background (CMB) radiation is slightly ‘hotter’ where there are more galaxies.

This ‘warming’ arises because CMB photons have their frequencies altered by gravitational fields. When these photons pass by a concentration of mass (such as a galaxy) and fall into its gravitational well, they gain energy. But then they lose the same amount of energy as they climb out of the well. Or at least, they would do if all they encountered was normal matter. Because dark energy is gravitationally repulsive, it causes a gravitational well to become shallower as a photon passes through it. The photon then exits with a slight energy gain.

This would make the CMB hotter where there are more galaxies.

Scranton *et al.* have now identified just such a positive correlation between the CMB temperature map and the distribution of about 25 million galaxies. Assuming that (as is generally thought) the Universe is flat, dark energy seems to be the only explanation for the correlation.

Philip Ball

## Biomaterials

## Take a break

*Development* **130**, 4123–4133 (2003)

Embryonic bone development and adult fracture repair may be two sides of the same coin. Both processes involve progenitor cells, which clump together and then produce cartilage and bone. And both require a blood supply to be established, to keep the cells alive.

Céline Colnot *et al.* now report another similarity. The group looked at how adult bones repair themselves in the absence of matrix metalloproteinase 9 (MMP9), a molecule known to regulate blood-vessel formation in developing bones. They found that fractures in adult mice lacking the *Mmp9* gene took longer to heal than normal, partly because blood vessels took longer to form in the damaged area. The situation could be rectified by injecting vascular endothelial growth factor (VEGF) into the fracture site, where it stimulated the recruitment and/or production of blood-vessel cells and cartilage- and bone-making cells. This suggests that VEGF and MMP9 may act together to coordinate skeletal repair.

Colnot *et al.* speculate that adult bone repair and early bone development share similar molecular mechanisms that rely on MMP9. As a result, embryonic programmes may be reactivated in later life to help fix broken bones.

Helen R. Pilcher

## Animal behaviour

## Bowerbird blues

*Anim. Behav.* **65**, 1077–1083 (2003)

Male strategies to entice a female to mate may, according to one hypothesis, tap into a pre-existing bias in the female’s sensory system. Joah Madden and Kate Tanner have tested this possibility in five species of bowerbird, the males of which attract females by building and decorating elaborate displays, or bowers. Among the decorations they use are fruits of different colours, employed as ornaments not food. Madden and Tanner searched for such a pre-existing bias, sculpted by foraging preferences, by presenting males and females of several species, held in Australian zoos, with grapes artificially coloured in different hues.

The five species did not show a common bias in sensory preference for any single



A female satin embowered bird.

colour. The sample size precluded a full statistical analysis, but suggested that the birds fell into two groups, with closer relatives preferring similar colours. Stronger support for the sensory-bias hypothesis came, however, from two intensively studied species, the satin and regent bowerbirds. In these cases Madden and Tanner did indeed find a relationship between male preferences for fruit colour used in bower decoration (blue) and female preferences for the colour of fruit eaten.

Tom Clarke

## Microbiology

## Aspirin bites at bugs

*J. Clin. Invest.* **112**, 222–233 (2003)

The all-purpose drug aspirin helps to reduce the virulence of the common hospital bug *Staphylococcus aureus*. Leon Iri Kupferwasser *et al.* show that it does so by directly affecting the bacterium, not the patient.

The authors soaked *S. aureus* in the main *in vivo* metabolite of aspirin, salicylic acid, and injected the bugs into rabbits. The heart-valve abscesses that formed were roughly half the size of those produced on injecting untreated bacteria. This suggests that aspirin acts on the bacteria, contradicting the previous assumption that it fights infection by stopping blood platelets from clumping together in infected areas of the body.

Kupferwasser *et al.* also found that salicylic acid switches on the *sigB* system in *S. aureus* that enables the bacterium to respond to stressful conditions. This triggers a drop in the production of fibronectin-binding protein — used to bind to and infect host tissues — and the toxin  $\alpha$ -haemolysin. Finally, bugs lacking the *sigB* gene no longer reacted to salicylic acid.

The authors suggest that patients with *S. aureus* infections, which are common following the use of intravenous tubes and prosthetic implants, might benefit from treatment with aspirin alongside standard antibiotics. Its use might also help to avoid spiralling antibiotic resistance in the bacterium.

Helen Pearson