Molecular biology

Breaking up is hard to do

Science **303,** 243–246 (2004)

Cells protect the integrity of their genome using a process called recombination. This process also occurs during meiosis — when sex cells are being formed — and is essential for the production of genetic diversity.

During recombination, chromosomes become joined and swap segments of genetic information; afterwards, they must separate. Bacterial enzymes that aid chromosome separation are known, but the identities of the mammalian proteins concerned are uncertain. Yilun Liu *et al.* report that a molecule called Rad51C may be involved. When the protein is absent from cell extracts, DNA separation is reduced. When Rad51C is added back, chromosomes can break apart.

The study suggests that Rad51C — or a protein associated with it — acts as a DNA-separating enzyme in mammalian cells. Its discovery should help researchers understand how recombination is completed within nuclei. **Helen R. Pilcher**

Neuroscience

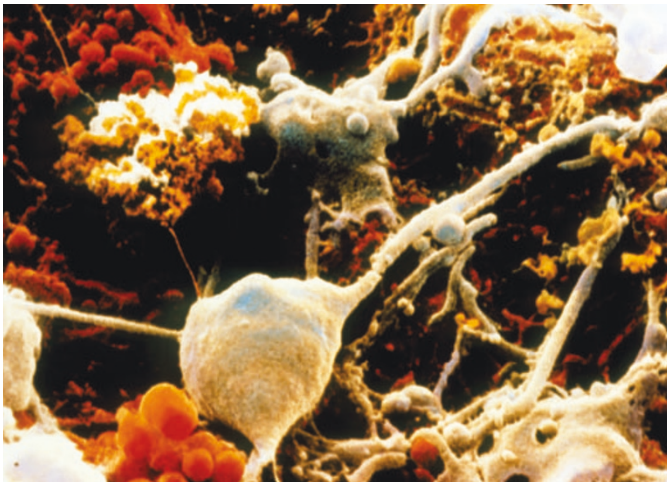
Neurons get dressed

Phys. Rev. Lett. **91,** 268101 (2003)

The network of neurons in the brain is supported by a mass of glial cells, whose functions include supplying the neurons with nutrients and removing dead tissue. A particular type of glia, called astrocytes, can also bind glutamate and thereby affect the communication between neurons. Yet most models of the electrical responses of neurons consider only 'naked' neurons, ignoring any interaction with the surrounding glia.

Suhita Nadkarni and Peter Jung have developed a model of electrical activity in the brain that includes such interactions — these neurons are fully 'dressed'. The model predicts that when a dressed neuron is exposed to a small electrical stimulus, its action potential is more likely to spontaneously oscillate than previous estimates have suggested. Oscillations of the neuron's action potential are associated with the seizures that are common in epilepsy.

Astrocytes of people with temporal lobe epilepsy tend to have extra glutamate-binding receptors. Nadkarni and Jung suggest that the extra receptors make spontaneous oscillations among neurons more likely, supporting the idea that overexpression of glutamate receptors could cause epilepsy. **Mark Peplow**



P. MOTTA/DEPT ANATOMY/UNIV. "LA SAPIENZA", ROME/SPL

Dressed for the occasion. Glial cells (red) surround neurons (grey) and influence their electrical environment — a factor taken into account in a new model of neuronal behaviour.

Martian geology

Ice sculpture?

Geophys. Res. Lett. doi:10.1029/2003GL018575 (2003)

The dry valleys of Mars remain as mysterious as ever. The notion of a warm, wet early Mars seems to be undermined by simulations that suggest that an atmosphere of carbon dioxide and water vapour might never have been thick enough to raise global temperatures to near water's freezing point. In other words, it might have snowed on Mars, but it was too cold to rain.

Michael H. Carr and James W. Head III propose that the large amounts of surface water required to carve out channels hundreds of kilometres long might have come from thick glaciers and ice sheets that melted at their base. The internal heat of the young planet, although more intense than it is today, is not likely by itself to have been sufficient to melt a veneer of ice at the planet's surface. But the melting point of ice is pressure-dependent: ice squeezed at the bottom of thick ice sheets melts more readily. If, as seems possible, Mars once had thick ice sheets extending to low latitudes, Carr and Head calculate that they could have undergone extensive basal melting. Ground temperatures of just 230 K could have been sufficient to induce the melting of snowpack and ice 50 m below the ice-sheet surface. **Philip Ball**

Astrophysics

A double-pulsar binary

Science doi:10.1126/science.1094645 (2004)

Pulsars offer a unique laboratory for studying relativistic gravity and plasma physics. So the discovery by A. G. Lyne and colleagues of a double-pulsar system — the first ever seen — will delight physicists of all flavours.

Late last year, the same group reported the discovery of a binary system comprising a pulsar and a neutron star (*Nature* 426, 531–533; 2003). Now they say that the neutron star is in fact a second pulsar, whose radiation is severely moderated by its larger sibling.

Analysis of the pulse frequencies and of the pulsars' elliptical orbits has already yielded measurements of the masses of the two bodies with a degree of precision that would not have been possible unless both stars were pulsars. And the orientation of the two pulsars means that the radiation from one shines through the magnetized volume surrounding the other, giving an unprecedented opportunity to probe the region immediately around each pulsar.

Other observations of the system fit well with predictions from Einstein's theory of relativistic gravity. Furthermore, Lyne *et al.* believe that their study already validates the suggested sequence for the evolution of such a system: a companion star spins up the pulsar, before becoming a pulsar itself in a supernova explosion. **Mark Peplow**

Neurodegenerative diseases

Plaque connection

Neuron **41,** 27–33 (2004)

Amyloid plaques are a hallmark of Alzheimer's disease: these protein clumps, which are composed of the β-amyloid peptide, build up around brain cells. Yet the links between β-amyloid and dementia are unclear.

Masuo Ohno *et al.* now provide genetic evidence that soluble β-amyloid may trigger Alzheimer's disease. The team studied a strain of dementia-prone mice. Normally, these rodents have high levels of β-amyloid peptides and show cognitive impairment as they age — they become less able to remember cage mates and learned locations. But Ohno *et al.* find that when a key enzyme, called BACE1, is removed, the mice stay healthy and dementia free. BACE1 is needed for amyloid production; without it, amyloid levels remain low and nerve cells stay healthy.

The study suggests that elevated β-amyloid levels cause the cognitive decline associated with Alzheimer's disease. The authors hope that BACE1-inhibiting drugs will stave off or even reverse dementia in humans. **Helen R. Pilcher**