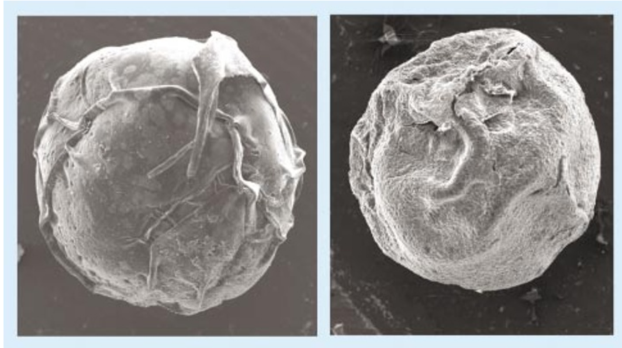

Spot the similarity: fresh (far left) and mineralized lobster eggs. Scale bars, 500 μm.

Molecular biology

Dynamics of condensed DNA

Science **299,** 719–721, 721–725 (2003)

Inside the cell nucleus, DNA is packaged into a compact form called chromatin. Of the two main types of chromatin, heterochromatin is particularly highly condensed and comprises genetic information that is generally kept silent. The protein HP1 is thought to crosslink chromatin in a stable fashion, creating a dense heterochromatin environment that is impermeable to gene activators.

Two groups now challenge this view. Using cells that produce HP1 fused to green fluorescent protein (GFP), they determined HP1's mobility by measuring fluorescence recovery after bleaching. Richard Festenstein *et al.* generated mice that express GFP–HP1 in T cells, whereas Thierry Cheutin *et al.* looked at Chinese hamster ovary cells. Fluorescence recovery was rapid, indicating that HP1 is highly mobile. There was an immobile fraction in resting T cells, but in activated T cells the protein's mobility increased, and the immobile fraction was smaller.

So it seems that HP1 can be released from and then re-bind to heterochromatin. The authors conclude that heterochromatin is not, as previously suspected, inaccessible to other proteins: the continuous exchange of HP1 may allow gene regulators to compete for binding. **Arianne Heinrichs**

Palaeontology

Going to work on an egg

Geology **31,** 39–42 (2003)

Among the records of early life are tiny fossilized eggs and embryos, presumably produced by invertebrate animals and dating to around 570 million years ago. Derek Martin and colleagues have carried out a lab study of how such fossils might have formed, using eggs of the European lobster (*Homarus gammarus*).

The eggs were kept in vials of artificial sea water, with a soupçon of added sediment, simulating coastal or estuarine conditions. After 36 days, the eggs were examined by scanning electron microscopy. Mineral coatings some 50 mm thick were evident, with preservation of surface features seen in both fossil and fresh eggs (see picture), and the process occurred in the absence of larger organisms as a source of mineralizing agents. The coatings were mainly of calcium carbonate, whereas phosphate is the mineral responsible for fossilization of the ancient eggs. But Martin *et al.* point out that, once the egg's outer surface has become stable, preservation with phosphate may then occur over longer periods of time. **Tim Lincoln**

Neurobiology

Stem cells stop dead

Neuron **37,** 209–219 (2003)

Some stem cells give rise to more cells in culture than they do during normal development. So how do they know when to stop dividing? Bruno C. Bello *et al.* find that, at least in parts of the developing fruitfly, precisely timed cell suicide is the answer.

In fruitfly larvae, neuronal precursors in the abdomen normally produce an average of nine new cells. But when Bello *et al.* prevented the precursors from committing suicide, 34 cells were generated instead. A pulse of Abdominal-A (AbdA) protein — one of the family of Hox developmental proteins, which distinguish head from tail — normally triggers the cell death. The team genetically engineered larvae to produce a premature burst of AbdA, which killed the precursors and slashed their progeny number.

The study is one of the first to show that Hox proteins directly affect cell division. Researchers now hope to find out whether related proteins that are active in the developing vertebrate nervous system might also control stem-cell proliferation by triggering well-timed death. **Helen Pearson**

Fluid dynamics

Turbulence made hard

Phys. Rev. Lett. **90,** 034502 (2003)

The elusive state of convection known as 'ultrahard turbulence' is real, claim Detlef Lohse and Federico Toschi.

Convection — the rising of warm, buoyant fluid through cooler fluid — occurs in the atmosphere, the oceans, the deep Earth and many industrial processes. The fluid motion becomes turbulent when 'driven' hard, for example by sufficiently strong heating from below. Heat transport from bottom to top is related to the Rayleigh number, Ra. Theory predicts that the heat transport is proportional to Ra2/7; experimentally, exponents of between 1/4 and 1/3 are found. At very high Rayleigh number, however, it has been predicted that the scaling should change to Ra1/2 — which matters if, for example, you are trying to predict heat extraction in a nuclear power plant.

Lohse and Toschi have simulated convection in a way that eliminates effects at the boundaries of the fluid, and see the Ra1/2 law at rather modest values of Ra. They conclude that an experiment might reach this regime if the influence of boundary layers could be eliminated. **Philip Ball**

Evolution

Aquatic life and the larger male

Evol. Ecol. Res. **5,** 105–117 (2003)

In nearly all species of spider, females are much larger than males. One possible explanation — that males are miniaturized for mobility — now receives support from studies of *Argyroneta aquatica*, in which males are 30% bigger than females. This is the only spider to live entirely in water; the animals weave an underwater web and fill it with air, like a diving bell, returning to the surface to replenish it. Dolores Schütz and Michael Taborsky find that male *Argyroneta* are more active and better divers than females. This, they believe, is partly a consequence of their size, as larger animals overcome water resistance more easily. Males have longer front legs than females and a streamlined shape, which may also be adaptations for diving.

When it comes to terrestrial mobility, smaller size may be preferable because less work needs to be done against gravity. Males tend to travel to find mates, whereas females typically stay put. Other researchers have suggested that the evolutionary pay-off for larger females is increased fecundity. **John Whitfield**