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PHYSIOLOGY

To flee or not to flee

Proc. R. Soc. Lond. B. doi:10.1098/rspb.2006.3755 (2006)

If not exposed to predators regularly, animals seem to lose the physiological triggers that could save them from being eaten, a new study suggests.

For millions of years, until dogs and cats showed up a century and a half ago, marine iguanas (pictured right) lived in the Galapagos Islands without major land predators. In an experiment, researchers chased iguanas that still live in isolated areas; the animals, they found, did not generate the stress hormone corticosterone. But iguanas living near a town, and presumably more used to being attacked by predators, did produce the hormone.

The iguanas were fast learners, however. Even the naive animals quickly started producing the hormone after being chased a couple of times, says a team led by Thomas Rödl of Princeton University, New Jersey.

CHEMISTRY

Same key, different lock

Nature Chem. Biol. **2,** 724–728 (2006)

Enzymes are so good at chemical reactions that they are sometimes too good to be useful when making new compounds. The enzymes are too specific, and always carry out the same reaction. One way around this is to engineer or evolve the enzymes to do what's wanted of them. Another solution, highlighted by Stephen Withers at the University of British Columbia in Vancouver, Canada, and his group, is to instead tweak the substrate, or landing pad for the enzyme, through a temporary modification.

When joining sugars together, adding an extra molecular group to one of them allows enzymes called glycosyltransferases to link them up in different configurations. This relatively simple strategy can produce a range of strikingly different products. Synthetic chemists, take note.

MEDICINE

A one-two punch for cancer

Science **314,** 1308–1311 (2006)

Adding a genetically modified bacterium to chemotherapy drugs fights cancer better than the drugs alone, new work suggests.

Getting cancer treatments to kill cancerous, but not healthy, cells is a major problem for drug delivery. Now, a team led by Shibin Zhou and Bert Vogelstein at the Johns Hopkins Kimmel Comprehensive Cancer Center in Baltimore, Maryland, says that adding the bacterium *Clostridium novyi-NT* can help.

The combination treatment caused both large and small tumours in mice to shrink. The bacterium may draw the drug more selectively to the cancer cells, helping it to better penetrate and destroy the tumour.

GEOLOGY

Drilling deep

Geophys. Res. Lett. **33,** L21314 (2006)

The first-ever deep-drilling programme into California's infamous San Andreas Fault is starting to yield information about the mineralogy of the rocks there.

John Solum of the US Geological Survey in Menlo Park, California, and his colleagues have identified several distinct mineral assemblages, down to nearly the bottom of their 4,000-metre-deep hole.

In particular, the mineral serpentine — sometimes seen along the San Andreas at the surface — appeared in the layer where the fault was actively deforming the rocks. The presence of serpentine, some think, could help explain certain details of how the fault behaves.

Coring at the San Andreas Fault Observatory at Depth, a US government project, begins again next summer.

PHYSICS

Liquid-controlled light

Appl. Phys. Lett. **89,** 211117 (2006)

The passage of light through a layer of silicon can be controlled using liquid droplets less than 1 femtolitre in volume.

Francesca Intonti of the European Laboratory for Non-Linear Spectroscopy in Firenze, Italy, and her colleagues placed drops of water into selected pores in a silicon wafer. Light moving through the silicon was then constrained to the S-shaped path marked out by the drops.

The technique could provide a new method for constructing analogues of electronic semiconductor devices, such as optical switches.

JOURNAL CLUB

Lewis E. Kay
University of Toronto, Canada

The molecular dance of a protein allows a chemist's secret wish to come true.

One fascinating aspect of molecular function is the way information propagates between parts of a molecule that can be many tens of angstroms apart.

Our understanding of how proteins do this, a process termed allostery, emerged from Max Perutz's pioneering studies of oxygen-carrying haemoglobin. Three-dimensional images show that when a ligand binds to part of the molecule, a discrete set of structural changes take place at distinct sites. This, in turn, influences the ease with which subsequent ligands bind.

Nature has chosen this model in designing many allosteric proteins. However, as a practising nuclear magnetic resonance (NMR) spectroscopist with a strong interest in protein dynamics, I was secretly hoping she might design proteins in which information is communicated through changes in the dynamics between distal sites, with little or no change in overall structure. Moreover, I was rooting for NMR to play a major role in characterizing such a system.

How exciting it was, therefore, to read that Charalampos Kalodimos and his co-workers recently found such a case by studying the motional properties of a protein in different ligated states (N. Popovych *et al. Nature Struct. Mol. Biol.* **13,** 831; 2006). Using NMR spectroscopy, the team quantified protein dynamics for a wide range of timescales. Remarkably, ligand binding at one site is linked to changes in motion far removed, over the complete set of timescales, while a corresponding propagation of structural changes does not occur.

The work of Popovych *et al.* provides a striking example of the importance of protein dynamics to information transfer. I eagerly await the discovery of more molecular dances and of how they, too, will relate to biological function.