Interplanetary ecology

Niche prospects on Mars

Icarus **169,** 300–310 (2004)

Microorganisms that harness solar energy must gather enough visible light to carry out photosynthesis while avoiding the DNA-damaging effects of ultraviolet (UV) radiation. Today, Earth is shielded from UV radiation by the ozone layer. But these microorganisms probably arose without such protection — raising the intriguing question of whether there are places on harsh worlds, such as Mars, where microbes might get enough light while being sheltered from UV radiation.

Charles S. Cockell and John A. Raven propose that there may indeed be such niches on Mars. Their conclusion is based on a model of how radiation travels through the martian atmosphere, along with lab observations of the way light penetrates various substrates.

Compared with Earth, the martian surface receives UV radiation up to a thousand times more damaging to DNA, and only 55% of the visible light. Nonetheless, photosynthetic organisms could potentially flourish under a few millimetres of iron-containing sediment, rock or salts, or a few centimetres of snow, the authors calculate. They brand these regions 'martian Earth-like photosynthetic zones', and suggest that they resemble the regions where Earth's sun-loving microbes arose billions of years ago. **Michael Hopkin**

Developmental biology

End extension

Proc. Natl Acad. Sci. USA
doi:10.1073/pnas.0402400101 (2004)

Telomeres — the ends of chromosomes — become frayed during life and are restored when sperm and eggs are made. But there has been conflicting evidence about whether they are also repaired in cloned animals, which bypass normal fertilization. Sonja Schaetzlein *et al.* show that, in some cases at least, telomeres are indeed restored during early embryonic development following cloning.

The authors measured the length of telomeres in cow fibroblast cells whose nuclei were used for cloning, and in embryos produced by cloning or conventional breeding. They used a fluorescent probe that attaches to telomere-specific genetic sequences: the longer the telomere, the brighter the fluorescent signal. Following cloning, telomeres were shorter than normal when the embryos were still a compact ball of cells called a morula. But later, when the embryos had expanded into a blastocyst, their telomeres were restored to normal length. Regular cow and mouse embryos also showed telomere lengthening during the transition between these stages.

Because decaying telomeres are thought to contribute to cell ageing, Schaetzlein *et al.* suggest that deciphering and reactivating this elongation programme might help to prolong the life of cells used in treatments. It remains unclear why telomere repair does not occur in cloned animals derived from some other cell types. **Helen Pearson**

Analytical chemistry

A faster pollution detector

Anal. Chem. doi:10.1021/ac0498260 (2004)

A specially modified mass spectrometer can detect urban pollutants with much greater sensitivity and speed than rival methods. Robert S. Blake and colleagues report that their combination of a proton-transfer ionization reaction with time-of-flight mass spectrometry has improved detection sensitivity more than 100-fold, such that trace volatiles can be picked up at concentrations of parts per billion. Unlike other systems, complex mixtures can be analysed in under a minute, and the mass range is not limited to smaller molecules.

The analysis begins with the ionization of water vapour, to create H_3O^+ ions, by α-particles emitted from a radioactive americium source. H_3O^+ ions are the proton carriers found in aqueous acids, and will transfer H^+ to any molecule that has a higher proton affinity than water. This includes most of the volatile organic compounds that are important trace pollutants, but excludes the major components of air such as oxygen and carbon dioxide, thus avoiding problems of strong background signals. The protonated organic molecules, now positively charged, move through an electric field until they hit a detector. Their time of flight is measured to calculate their mass.

The authors claim that this technique could be used to detect the small quantities of numerous heavy, volatile organic compounds that may make a substantial, but as yet unquantified, contribution to airborne pollution. **Mark Peplow**

Cancer

Fishing in the ribosome

PLoS Biol. **2,** 0690–0698 (2004)

Zebrafish are emerging as a promising model organism in cancer research. The latest news comes from Adam Amsterdam *et al.*, who show that in these fish many protein components of the ribosome, the site of protein synthesis, apparently function as tumour suppressors — that is, cancer is more likely to develop if they are absent.

Amsterdam *et al.* screened various lines of mutant zebrafish and found that, in several of them, mutations in genes encoding ribosomal proteins resulted in the development of tumours and subsequent early death. A systematic survey of other lines carrying mutations in different ribosomal proteins revealed that a high percentage were cancer prone, mostly developing malignant tumours of the sheaths that surround peripheral nerves.

B. BEVAN/ARDEA

It remains to be seen how mutations in ribosomal proteins predispose zebrafish to cancer. But the next step will be to see if a similar form of tumour suppression occurs in humans — as the authors point out, the action of mutated ribosomal-protein genes as 'cancer genes' may well have been overlooked. **Barbara Marte**

Biochemistry

An a-peeling idea

J. Agric. Food Chem. **52,** 2879–2886 (2004)

The peel of citrus fruits contains health-promoting chemicals called polymethoxylated flavones (PMFs), which are known for their anti-cancer and anti-inflammatory effects. A study in hamsters by Elzbieta M. Kurowska and John A. Manthey suggests that PMFs from tangerines might also help to lower cholesterol levels.

Kurowska and Manthey fed hamsters on a diet that produces high blood cholesterol levels. Animals that were also given 1% PMFs in their feed experienced a decrease of up to 40% in their concentrations of low-density lipoprotein — 'bad' cholesterol. Levels of 'good' cholesterol (high-density lipoprotein) remained unaltered, and there were no adverse side effects.

Similar results were obtained using a more concentrated supplement of flavanones, another type of chemical found in citrus fruit. So the authors speculate that PMFs have a more potent cholesterol-lowering effect than the flavanone alternative. PMF metabolites were found in the hamsters' livers, hinting that perhaps the chemicals owe their efficacy to their extensive absorption and metabolism. Their therapeutic potential in humans has yet to be tested. **Helen R. Pilcher**