RESEARCH HIGHLIGHTS

Selections from the scientific literature

SYNTHETIC BIOLOGY

Bacterial cyborg transmits electrons

One idea for biosensors and bioenergy is to combine living cells with inorganic materials. Researchers have taken a step towards this goal by engineering the bacterium *Escherichia coli* to transmit electrons to inorganic materials.

Cell membranes act as insulators and thus hinder the movement of electrons between cells and inanimate materials. Caroline Ajo-Franklin at the Lawrence Berkeley National Laboratory in Berkeley, California, and her colleagues overcame this by introducing genes for electron-shuttling proteins into *E. coli*. The genes occur naturally in another bacterium, *Shewanella oneidensis*, which can transfer charge to non-living materials in oxygen-free environments.

The engineered *E. coli* cells were able to reduce iron in culture six to eight times faster than normal strains. The authors say that these genes could be transferred to other microbes to create, for example, low-cost photobatteries — by inserting them into bacteria that generate electrons in response to light.

Proc. Natl Acad. Sci. USA **doi:10.1073/pnas.1009645107 (2010)**

F. LANTING/FLPA

H. MONTGOMERY/AP PHOTO

NATURAL RESOURCES MANAGEMENT

Better fishing for the future

Despite European Union rules controlling fishing catch sizes, fish stocks are collapsing. Change is needed to maintain populations at levels that can produce maximum sustainable yields, according to Rainer Froese at the Leibniz Institute of Marine Sciences in Kiel, Germany, and his colleagues. They have devised new rules that take a more cautious approach: limiting catches to levels that would leave species biomass at 1.3 times the total needed to produce maximum sustainable yields.

The current system, which regulates catch sizes according to the size of the smallest fish stock that could still deliver sustainable catches, encourages overfishing, the authors add. They say that their proposed rules would have prevented the collapse of the North Sea herring (*Clupea harengus*) in the 1970s.

Fish Fisheries **doi:10.1111/j.1467-2979.2010.00387.x (2010)**

EVOLUTIONARY BIOLOGY

Leopards change their spots

Tree-living cats that hunt by night in dense environments tend to have more complex coat patterns than plains-dwelling felines that are active during the day. The patterns seem to evolve relatively rapidly in response to environmental change and help the animals to remain camouflaged.

William Allen and his colleagues at the University of Bristol, UK, analysed images of coat patterns in 35 cat species, including leopards, jaguars (**pictured**) and tigers. They used a mathematical model to link pattern development and function to habitat and behavioural traits.

They also mapped pattern variation on a felid family tree. This revealed that patterns have changed frequently during felid evolution, suggesting that coat pattern is under simple genetic control.

Proc. R. Soc. B **doi:10.1098/rspb.2010.1734 (2010)**

CELL BIOLOGY

Quiescent cells not so quiet

Many of the body's cell types enter a state in which they do not divide and, or so scientists thought, reduce their metabolic rates. But Hilary Coller and her colleagues at Princeton University in New Jersey show that quiescent human fibroblast cells — common in connective tissues — have similar metabolic activity to their proliferating counterparts.

The team measured and analysed the levels of 62 metabolites extracted from the cells, as well as levels of secreted proteins. They found that quiescent cells were busy breaking down and resynthesizing proteins and lipids, as well as secreting proteins that help to maintain tissues. Moreover, inhibiting a metabolic pathway in these cells led to increased programmed cell death, leading the authors to suggest that certain dormant cells, such as cancer stem cells, can be selectively killed.

PLoS Biol. 8, **e1000514 (2010)**