

RESEARCH HIGHLIGHTS

Selections from the scientific literature

CELL BIOLOGY

A mammalian change of heart

Many fish can replace lost cardiac tissue throughout their lives, but adult mammals cannot. Researchers have now discovered a stage very early in life at which mammals can mend their own hearts through the replication of cells called cardiomyocytes.

Hesham Sadek and Eric Olson at the University of Texas Southwestern Medical Center in Dallas and their team surgically removed about 15% of muscle tissue from the ventricle walls of 1-day-old mice. One week later, they found evidence of cardiomyocyte proliferation in the heart. The animals fully recovered their muscle tissue and organ function within two months. The same procedure performed on 7-day-old mice did not lead to cardiomyocyte proliferation or recovery.

This work may lead to new strategies for reawakening regeneration in the adult mammalian heart after injury. *Science* 331, 1078–1080 (2011) For a longer story on this research, see: go.nature.com/i03ccw

CONSERVATION

Identifying reef fish at risk

More than one-third of coral-reef fish species in the Indian Ocean, such as the butterflyfish *Chaetodon trifascialis* (pictured), could become extinct in their local environment as a result of climate change.

Nicholas Graham at James Cook University in



Townsville, Australia, and his colleagues developed a method for predicting how vulnerable species are to local extinction, taking into account variables such as how picky the fish are about their food or habitat.

The researchers found that 56 of the 134 fish species studied were at risk of losing their habitat, shelter or food sources as a result of climate change. Interestingly, those fish at greatest risk from climate change were not the same as those at greatest risk from

overfishing. The predictions could be used to better manage animal populations and habitats, helping to ensure survival under climate change and other pressures.

Ecol. Lett. doi:10.1111/j.1461-0248.2011.01592.x (2011)

NEUROSCIENCE

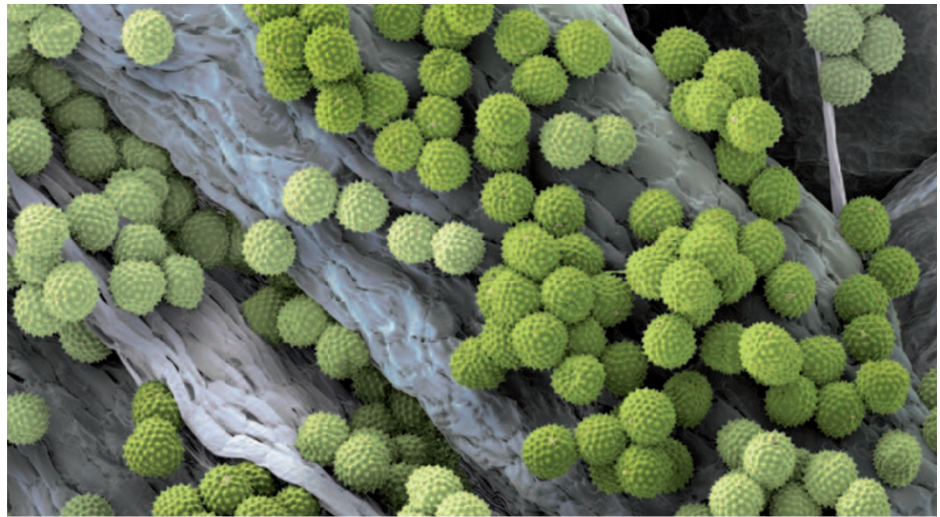
Think of yourself when quitting

In smoking-cessation programmes, cognitive therapy is more successful if it is tailored to individuals than if it is applied generically. The difference may lie in the recruitment of brain areas

activated by thinking about oneself, scientists have found.

Hannah Faye Chua and her colleagues at the University of Michigan in Ann Arbor presented would-be quitters with messages relevant to their lives and the obstacles they perceived to changing their smoking behaviour, while scanning their brains with functional magnetic resonance imaging.

Activation of the dorsomedial prefrontal cortex, an area that is activated when people think about themselves, was correlated with how likely participants were to have stopped smoking four months after the scanning.



CLIMATE-CHANGE IMPACTS

More sneezing in a warmer world

Climate change is bad news for people with allergies: a warmer climate means a longer pollen season. In just 15 years, the pollen season of one common allergen has lengthened by as much as 27 days in some parts of North America.

The prevalence of allergies is increasing in the United States, but linking this increase with climate change has been a stretch. A team led by Lewis Ziska at the US Department of Agriculture in Beltsville, Maryland, compared readings

of ragweed pollen (pictured) since 1995 at 10 stations across North America with changes in temperature and first frost. They found a clear link between recent warming and the length of the pollen season. What's more, the farther north they looked, the greater the extension to the season — so allergy-prone Canadians should consider buying tissues in bulk.

Proc. Natl Acad. Sci. USA doi:10.1073/pnas.1014107108 (2011)

This correlation was not seen when the patients were given non-tailored messages about smoking during scanning. *Nature Neurosci.* doi:10.1038/nn/2761 (2011)

BIOLOGY

Predators trigger plankton stealth

Tiny water-dwelling organisms called phytoplankton can adopt a 'stealth' mode to avoid the attentions of predators.

Many types of plankton group together into chains, and some respond to grazers by increasing their group size until the chains are too large to eat. Erik Selander of the Technical University of Denmark in Charlottenlund and his colleagues show that predators can trigger the opposite response in *Alexandrium tamarense*.

When exposed to small plankton-eating crustaceans called copepods, chains of *Alexandrium* adopt stealth behaviour, splitting into single cells or very short chains and swimming more slowly. The phytoplankton drastically reduces its encounters with grazers through this mechanism, the authors report.

Proc. Natl Acad. Sci. USA doi:10.1073/pnas.1011870108 (2011)

EPIDEMIOLOGY

Farm kids benefit from microbes

Exposure to diverse microbes could explain why children who grow up on farms are less likely to develop asthma than their suburban counterparts.

Previous work showed that children raised on farms are protected from childhood asthma and a class of allergic reactions called 'atopy'. Now, Markus Ege of the University Children's Hospital Munich in Germany and his colleagues have analysed the microbial populations in dust collected from 933 children's rooms. They found that bacteria and

fungi were more numerous and widespread in samples collected for children who live on farms. They also found that the risk of asthma and atopy decreased as the number of microbial taxa increased. In particular, fungi from two genera, *Eurotium* and *Penicillium*, were tightly associated with reduced asthma risk.

N. Engl. J. Med. 364, 701–709 (2011)

CLIMATE CHANGE

Sea-ice models don't measure up

Climate models do a poor job when it comes to simulating sea-ice change in the Arctic.

Michael Winton of the Geophysical Fluid Dynamics Laboratory in Princeton, New Jersey, compared data from the era of satellite observations and five state-of-the-art climate models of Northern Hemisphere sea-ice cover. All of the model simulations considerably underestimated the observed sea-ice decline.

Substantial natural variability in the annual sea ice would be necessary to explain the discrepancy between observations and even the best-performing model. It is more likely that current climate models are not nearly sensitive enough to accurately gauge the behaviour of sea ice in response to warming, the authors say.

J. Clim. doi:10.1175/2011JCLI4146.1 (2011)

GENETICS

Clues from big-hearted mice

Mice bearing the mutations underlying two human heart syndromes have pointed the way to possible treatments. Noonan and LEOPARD syndromes both cause short stature, facial deformities and abnormally thick hearts that cannot pump properly.

Benjamin Neel and Toshiyuki Araki of the Ontario Cancer Institute in Toronto,

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ANIMAL BEHAVIOUR

Dogs keep an eye on their owners

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up to 21 February

Dogs are famously good at reading human body language, following human gaze and stealing human food. But not all humans are equal in the eyes of *Canis familiaris*.

Paolo Mongillo and his colleagues at the University of Padua in Italy investigated the attention dogs paid to their owners and to strangers. Each dog watched as its owner and a stranger walked back and forth across a test room in opposite directions, popping in and out of two doors.

Not surprisingly, the dogs kept their eyes on their owners most of the time, and stared at the doors they had gone through. At least, young dogs did. Dogs over the age of seven didn't stare at the door their owners had gone through with the same frequency, perhaps indicating some cognitive decline, or that they have learned over the years that their owners always come back in the end.

Anim. Behav. 80, 1057–1063 (2010)

Canada, and their co-workers, engineered mice to have the mutation in the *Raf1* gene that underlies Noonan disease. In addition to features of the human syndrome, the mice had increased activity of the Mek protein. Pups given a Mek inhibitor started small but they grew faster and caught up with normal mice by a couple of weeks after birth.

Meanwhile, Neel and Maria Kontaridis of Harvard Medical School in Boston and their colleagues inserted into mice the mutation in the *Ptprn11* gene that causes LEOPARD syndrome. The activity of a protein called mTor was abnormally high in these mice, and giving them the mTor inhibitor rapamycin repaired heart defects.

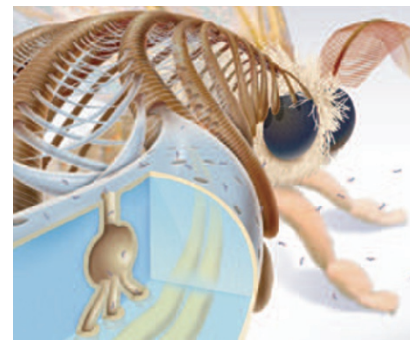
J. Clin. Invest. doi:10.1172/JCI44929 (2011)

J. Clin. Invest. doi:10.1172/JCI44972 (2011)

NANOTECHNOLOGY

Slip and slide pores for sensors

Taking their inspiration from nature, researchers have coated nanopores with fluid bilayers to sense single proteins. The



creation, which mimics the pores in the olfactory system of a silk moth (pictured), was developed by Michael Mayer at the University of Michigan in Ann Arbor, Jerry Yang at the University of California, San Diego, and their team.

By modifying the lipid with specific ligands, the researchers can control which proteins move through the pore, and how long their journey takes. The system can also be tweaked to slow down proteins that would otherwise translocate too fast to be analysed accurately. *Nature Nanotechnol.* doi:10.1038/NNANO.2011.12 (2011)

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