

RESEARCH HIGHLIGHTS

K. INOMATA

A grey's anatomy

Cell **137**, 1088–1099 (2009)

It seems that stress really can turn hair grey.

Emi Nishimura of Tokyo Medical and Dental University and her colleagues have found that ionizing radiation turns mouse fur permanently grey by depleting the stem cells that make melanocytes — pigment-producing cells — in the hair follicle. DNA-damaging chemicals have

a similar effect.

Unexpectedly, cell death was not directly to blame for this stem-cell depletion. Rather, DNA damage prolonged the activation of a protein called MITF, which regulates melanocyte

maturation. This activation enhanced the cells' development into melanocytes, leaving no stem cells behind to colour the next cycle of hair growth.

But by tracking the positions of delta opioid receptors fused to green fluorescent protein in mice, Allan Basbaum of the University of California, San Francisco, and his colleagues suggest that several assumptions made about this receptor are untrue. Mu and delta opioid receptors inhabit different nerve fibres, and have separate roles in controlling pain: mu receptors for heat and delta receptors for mechanical stimuli.

PLANT GENETICS

Asexual *Arabidopsis*

PLoS Biol. **7**, e1000124 (2009)

Plant breeders have come a step closer to apomixis — asexual production of seeds — in plants that normally reproduce sexually. The switch could lead to consistently higher yields in some crops by stemming the genetic mixing that occurs during sexual reproduction.

Raphaël Mercier of the French National Institute for Agricultural Research in Versailles and his colleagues identified an *Arabidopsis thaliana* gene in which mutation prevents plants from completing the second round of cell division that occurs during meiosis, the sexual form of cell division that produces pollen and ova. They call this gene omission of second division (*OSD1*). When the researchers combined mutations in *OSD1* with mutations in previously discovered meiosis genes, the resulting plants produced their reproductive cells by asexual division, or mitosis.

For a longer version of this story, see: <http://tinyurl.com/mk2xe8>

IMMUNOLOGY

Trouble for termites

Proc. Natl Acad. Sci. USA doi:10.1073/pnas.0904063106 (2009)

Termites and other insect pests could be vanquished by short-circuiting their immunity and letting microbial infections do the rest.

Mark Bulmer of Northeastern University in Boston, Massachusetts, Ram Sasisekharan at the Massachusetts Institute of Technology in Cambridge and their colleagues studied a Gram-negative-bacteria-binding protein, GGBP2, that termites maintain in immune cells and secrete throughout their nests. The protein recognizes carbohydrates associated with infectious microbes, and cleaves them, creating fragments that prime the insects' immune systems.

AGRICULTURE

No hectare spare

Glob. Change Biol. **15**, 1716–1726 (2009)

Increased agricultural yields do not necessarily free up land for nature, say Robert Ewers, now at Imperial College London, and his colleagues. Some conservationists have argued that intensive agriculture could result in such 'land sparing', but other forces tend to keep land under the plough.

The researchers analysed changes in yields of the world's 23 most important food crops and in per-capita cropland area for 124 countries between 1979 and 1999. Developing countries showed the strongest link between increased yields and reduced farmland area, but this was largely counteracted by farmers growing cash crops on land no longer needed for staples. No such trend was seen for developed countries — perhaps, the team suggests, because agricultural subsidies mean that land is farmed whether it's needed or not.

HUMAN EVOLUTION

Not so clean sweep

PLoS Genet. **5**, e1000500 (2009)

Neutral forces such as population migrations and the random accumulation of mutations seem to have had an important role in shaping how natural selection acts on human genes,

observe Jonathan Pritchard of the University of Chicago in Illinois and his colleagues.

The team compared the relative occurrence of variations at individual nucleotides among the genomes of almost 1,000 individuals from diverse geographic locations to see in what cases variations have become fixed.

As expected, variations in and around genes showed stronger signs of fixation, indicative of selection. But only rarely did strong selective action allow a new mutation to sweep through the population and become fixed. The authors suggest that simultaneous partial sweeps may have driven adaptation, or that humans are less adaptable than many suspected.

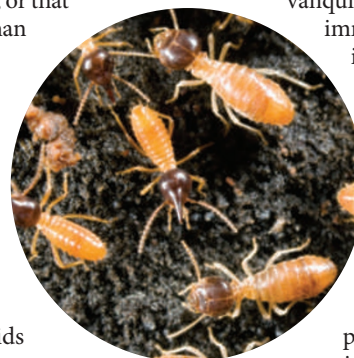
PHYSIOLOGY

Pain's new path

Cell **137**, 1148–1159 (2009)

Delta and mu opioid receptors regulate pain transmission in the nervous system. Morphine and some endogenous opioids act on mu receptors to relieve pain, for example. But the role of delta receptors has been less clear.

The two types of receptor have long been thought to occupy the same pain-sensing neurons and to work in a cooperative fashion.



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