

RESEARCH HIGHLIGHTS

EVOLUTIONARY BIOLOGY

Lice in hiding

Am. Nat. doi:10.1086/656269 (2010)

Bird lice reduce their chances of being picked off by their hosts by evolving to match the colour of the birds' feathers.

Camouflage has been well documented in predator-prey relationships. Sarah Bush and her colleagues at the University of Utah in Salt Lake City now report that the same evolutionary trend exists between parasites and their hosts.

By comparing lice from species of dark- and light-coloured birds (pictured), the researchers found that 'feather' lice — which live on a bird's body — match the colour of their host's plumage (insets). However, 'head' lice do not necessarily blend in. This suggests that bird preening drives lice-colour evolution: birds cannot see or groom their heads, so there is no selective pressure for head lice to be camouflaged.



T. HAMPEL/UNIV. CHICAGO

APPLIED PHYSICS

Record data storage

Appl. Phys. Lett. doi:10.1063/1.3463470 (2010)

Data have been recorded on a tiny slice of a metal oxide at a density eight times that offered by today's most advanced magnetic disk drives.

In magnetic data storage, data are written to disk by a magnetic read-and-write head that changes the magnetization of a region a few hundred nanometres across. One option for boosting memory in ever-shrinking electronics is to use ferroelectric materials, in which data can be encoded in the polarization of smaller regions.

Kenkou Tanaka and Yasuo Cho at Tohoku University in Sendai, Japan, recorded 64×64 bits of real data at a spacing of 12.8 nanometres per bit on a crystalline slice of lithium tantalate. This amounts to a density of 0.6 trillion bits per square centimetre.

NEUROSCIENCE

Quick mood lift

Science 329, 959-964 (2010)

Patients taking traditional antidepressants have to wait several weeks for the drugs to kick in. However, a few severely depressed patients taking ketamine, an anaesthetic and recreational drug, have shown improvement within hours. How does it act so quickly?

Ronald Duman and his team at Yale University in New Haven, Connecticut, show that the ketamine affects a brain signalling pathway called mTOR. Ketamine rapidly activated this pathway in the prefrontal cortex of healthy rats, resulting in the formation of more connections between

neurons. Treated rats also showed improved performance in three behavioural tests that model depression. These responses were all lost when the scientists blocked the mTOR pathway biochemically.

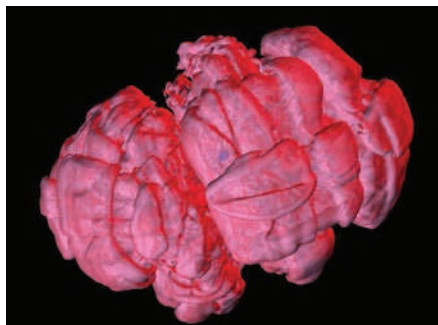
ASTRONOMY

Exploding computer models

Astrophys. J. 720, 694-703 (2010)

When a star much more massive than the Sun runs out of fuel, its core collapses and sparks an enormous explosion, or supernova. Neutrinos in the core are believed to be key to triggering the blast, but observations of neutrinos from real explosions don't match up well with theoretical predictions.

Jason Nordhaus of Princeton University in New Jersey and his colleagues think the problem may be a dimensional one. Most supernova computer models are one- or two-dimensional, to expedite calculations. When the team used supercomputers to run a three-dimensional simulation of a supernova, they found that the extra degree of freedom led to a significantly more efficient and vigorous, and earlier explosion (pictured) — a result that more closely matches observations.



ANIMAL BEHAVIOUR

Genetics and culture clash

Proc. R. Soc. B doi:10.1098/rspb.2010.1112 (2010)

Culture may not be the only factor underlying differences in tool use and other behaviours across groups of wild chimpanzees — genetic variation may also play a part.

Primatologists have previously invoked culture to explain why, for instance, one chimpanzee community digs for termites and another does not, even when their ecological environments are similar. Kevin Langergraber at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, and his team analysed DNA from cell organelles called mitochondria for 246 chimps spanning nine groups in East and West Africa to determine how the groups were related to one another. They then compared these relationships with existing data on whether or not members from these sites display any of 38 different behaviours — many involving tool use. Genetically related communities often had a similar suite of behaviours.

ASTRONOMY

Brown dwarf spotted

Astrophys. J. 720, L82-L87 (2010)

Scientists have directly imaged a brown dwarf — an object too big to be a planet yet not massive enough to ignite into a star — travelling in a highly eccentric orbit around its parent star. At its closest approach the companion is within 9 astronomical units of the star, a distance similar to that between Saturn and the Sun, whereas its furthest reach is double that distance.

Beth Biller at the University of Hawaii in

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