RESEARCH HIGHLIGHTS

EXOPLANETS

Explaining the eccentricities

Asrophys. J. **702,** 716–723 (2009)

The near-circular orbits followed by the planets in the Solar System are probably not the norm. Many planets travelling around other stars appear to follow an oblong or 'eccentric' path.

In some cases, that apparent eccentricity may be caused by the presence of a second, undetected planet. Timothy Rodigas and Philip Hinz at the University of Arizona in Tucson modelled a range of solar systems. They found that about 4% of the time, a hidden planet far from the star could create the illusion that the closer planet was in a highly eccentric orbit. The effect was much more pronounced for planets with moderately oblong orbits.

The team says that their study could help to explain the apparent abundance of eccentric exoplanets. It could also help researchers to find hidden planets.

BIOLOGY

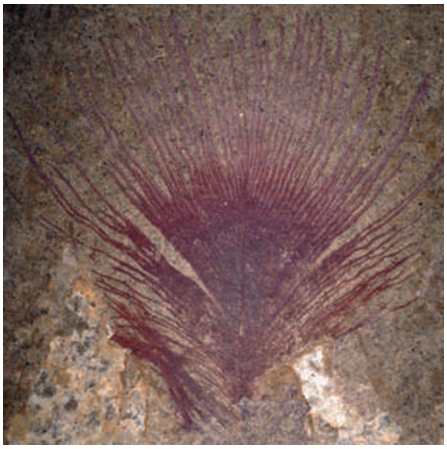
A colourful past

Biol. Lett. doi:10.1098/rsbl.2009.0524 (2009)

Reconstructions of extinct species often attribute garish colours to animals on the basis of nothing more than artistic licence. Now Derek Briggs of Yale University and his colleagues have discovered evidence of preserved colour in fossil feathers.

Using a scanning electron microscope, they found neatly organized pigment structures called melanosomes in fossils such as the one pictured below from the Messel Shale in Germany. Owing to the loss of surrounding keratin, which is involved in optical scattering, they could not determine the feathers' exact hue.

But comparison with the melanosomes of modern birds suggest black feathers with a iridescent blue, green or copper sheen.



J. VINTHER

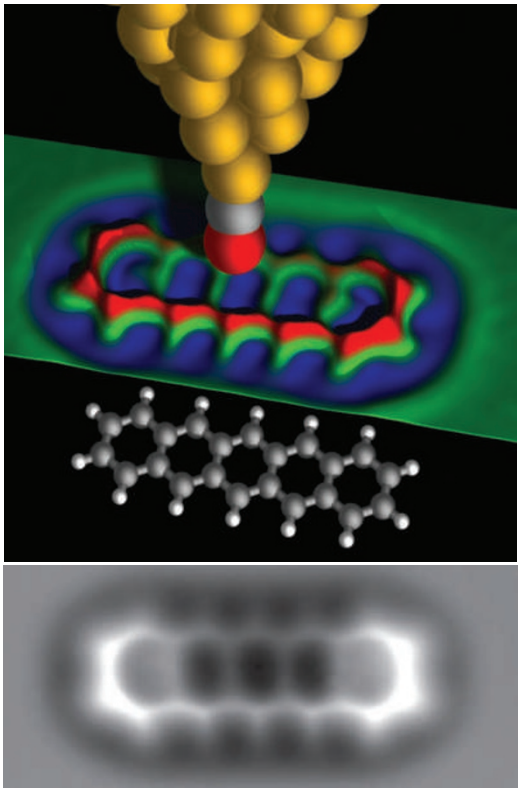
Seeing the honeycomb

Science **325,** 1110–1114 (2009)

Behold pentacene (pictured right), a five-ringed hydrocarbon molecule shown with remarkable clarity thanks to an atomic force microscope with a crucial modification.

Leo Gross and his colleagues at IBM Research in Zurich, Switzerland, placed a carbon monoxide molecule on the tip of the microscope's sensitive detector. The tip scans over the surface and is deflected by its interaction with the atoms in the sample.

Choosing the right molecule for the tip enabled repulsion due to the electronic exclusion principle to dominate over the blurring caused by attractive Van der Waals and electrostatic forces. The improved contrast allowed the researchers to resolve the positions of individual molecules and the bonds between them.



IBM RESEARCH, ZURICH

IMMUNOLOGY

Killer fat

Immunity **31,** 232–244 (2009)

Lipid droplets in a type of immune cell may have a key role in triggering attacks on infected and damaged cells.

Dendritic cells engulf pathogens, chop up their components and display the resulting antigens on their surfaces using the major histocompatability complex class I (MHC I) molecules. These antigens activate cytotoxic T cells, which seek and destroy infected cells.

Pierre Guermonprez at Rockefeller University in New York and his colleagues found that an enzyme residing on lipid droplet membranes is essential to this pathway. When the researchers eliminated the enzyme in mice, they found defects in the cells' lipid droplets and in their ability to display antigens through the MHC I pathway. The manipulation did not affect the MHC II pathway.

PAIN

Deep, deep in your head

Neuron **63,** 533–543 (2009)

The placebo effect is more hard-wired into the brain than previously thought.

For decades, scientists have known that sham treatments can relieve pain, and studies have identified natural opioid pathways as important players. But because the placebo effect seems to be linked to expectation, some have assumed that it occurs mainly through 'higher' brain structures associated with consciousness.

Falk Eippert at the University Medical Center Hamburg-Eppendorf in Germany and his team imaged the brains of volunteers given a sham ointment to relieve a mild burning pain. Half of them had been treated with naloxone, a chemical that blocks opioid signalling. The researchers found that placebo-related brain activity normally occurs in both the prefrontal cortex and more hard-wired areas, such as the amygdala, hypothalamus and parts of the brainstem.

CHEMISTRY

Bacterial factories

Biotechnol. Bioeng. doi:10.1002/bit.22502 (2009)

Researchers have engineered bacteria to produce useful levels of putrescine, a key ingredient in the production of plastics and industrial chemicals. Putrescine — a natural breakdown product of amino acids that contributes to the characteristic odour of rotting flesh — has historically been manufactured from petrochemicals through environmentally harsh methods.