RESEARCH HIGHLIGHTS

Mouthing off

J. Virol. **79,** 13587–13593 (2005)

Some plant viruses are transmitted only by a particular insect. However, they retain the ability to evolve quickly into a form that can be passed on by a different species, suggests work by Stéphane Blanc, of the Montpellier INRA Centre in France, and his colleagues.

The cauliflower mosaic virus has a protein that binds it to the mouth parts of an aphid (pictured). It hitches a ride on the aphid's stylet, which pierces the plant when the insect feeds.

The researchers identify the region of the protein that binds to the stylet, and pinpoint a single amino-acid residue that determines the protein's affinity for different aphid species. The virus can swap vectors by changing just this one residue.

V. STEGER/SPL

GEOPHYSICS

Intruders from the deep

Science **310,** 654–657 (2005)

Slow-spreading ridges on the ocean floor may incorporate older rocks from deep down into newly formed crust, say Joshua Schwartz, of the University of Wyoming in Laramie, and his colleagues.

The team performed radiometric dating on samples of the mineral zircon, collected from Atlantis Bank through submersible dives and dredging. This region is some 100 kilometres south of the ridge that separates the African and Antarctic plates. Around one-quarter of the samples turned out to be far older than is calculated by looking at the sea floor's magnetism — by up to 2.5 million years. The discrepancy can be explained if gabbroic rocks that crystallized up to 18 kilometres beneath the ridge were lifted up and mixed into crust forming at the crest of the ridge.

DEVELOPMENT

Extra strong eggs

Ecol. Lett. **8,** 1105–1113 (2005)

Support for the idea that the speckles on eggshells provide structural support, rather than camouflage, comes from a study of great tits' eggs.

The great tit (*Parus major*), like many other passerine species, lays white eggs with red speckles (pictured). Researchers led by Andrew Gosler of the University of Oxford, UK, collected more than 100 such eggs. They found that the pigment appears in regions where the shell is thinner, providing additional reinforcement — the thinner the shell, the more dense the pigment. What's more, egg clutches produced in regions naturally high in calcium tend to have thicker shells and fewer spots. The pigment compounds, known as protoporphyrins, may act as lubricants between the calcite crystals that make up the eggshells, reducing brittleness.

GENETICS

Tracing a cell's family tree

PLoS Comput. Biol. **1,** e50 (2005)

It is theoretically possible to construct the family tree of each cell in the human body, according to researchers in Israel. The team, led by Ehud Shapiro at the Weizmann Institute of Science in Rehovot, says that naturally occurring mutations could be used to trace the lineage of cells in a newborn baby back to the fertilized egg.

Shapiro and colleagues performed a mathematical study of the frequency of mutations in stretches of the genome known as microsatellites. They found that mutations occur often enough to track a cell's history back through 40 cell divisions.

Although genome sequencing technology is not yet advanced enough for the technique to be applied to whole people or even mice, the team hopes it will soon help to discover how cells in cancers grow and spread.

NEURODEGENERATION

Enzyme goes awry

Cell **123,** 277–289 (2005)

Mitochondria, the tiny bacterium-like structures that help to produce energy in our cells, have long been linked to a range of hereditary diseases. Now researchers in Germany and Italy have uncovered the role of one mitochondrial enzyme that is associated with progressive neurodegeneration.

A team led by Thomas Langer at the University of Cologne studied an enzyme called paraplegin, known to be faulty in patients with hereditary spastic paraplegia (HSP). Working in yeast and mouse cells, Langer and colleagues found that paraplegin controls the final step in the assembly of the mitochondrion's ribosomes, the molecular machines that make proteins.

In those suffering from HSP, the loss of axons, which carry nerve impulses, could be linked to faulty protein synthesis in their mitochondria.

R. PACKWOOD/OXFORD SCIENTIFIC FILMS

ALAMY

CHEMISTRY

Laundromaths

Langmuir **21,** 10106-10111 (2005)

For most people, doing laundry is a chore; but for chemists it's an absorbing problem. Dinesh Shah and colleagues of the University of Florida in Gainesville are tackling the spin-drying cycle.

Detergents contain surfactants that lower the surface tension of water, reducing how strongly moisture is sucked between cloth fibres. Simple reasoning therefore suggests that you will get drier clothes if you increase the concentration of detergent in the water.

Unexpectedly, Shah and his team find that the water content of fabrics after a spin cycle actually rises when surfactant concentration is increased beyond a certain level. They attribute this behaviour to the adsorption of surfactant molecules on to the fibres, which reduces the concentration of the molecules in the water. This provides a clue to how detergents could be designed to make clothes dry faster.

ASTRONOMY

When darkness lifted

Astrophys. J. **633,** L1-L4 (2005)

In the early Universe, the fog cleared quickly. That's the implication of an ancient galaxy detected by researchers using the Hubble and Spitzer Space Telescopes.

Bahram Mobasher of the Space Telescope Science Institute in Baltimore, Maryland, and his co-workers say that HUDF-JD2 is a massive galaxy that formed only a few hundred million years after the Big Bang, or as astronomers describe it, at a redshift of around 15. The light from the stars in this galaxy could have stripped electrons from the surrounding primordial gas, starting a process called reionization that makes the gas transparent to light. If so, this discovery will help to pin down the timing of the era of reionization — the end of what is known as the cosmic dark ages.

NEUROBIOLOGY

The nose knows

Nature Neurosci. doi:10.1038/nn1589 (2005)

It was thought that rodents detect pheromones — chemicals that influence their sexual and social behaviour — primarily through a specialized structure called the vomeronasal organ. But experiments in mice now show that the main olfactory system also plays a crucial role in picking up the signals that drive mating and aggression.

Male mice enigneered to lack a gene that underlies odour detection in the main olfactory tissue showed no interest in female mice, report Nirao Shah and his colleagues at the University of California, San Francisco. The mutants also showed reduced aggression when confronted by other male mice.

DYSLEXIA

Reading the genome

Proc. Natl Acad. Sci. USA doi:10.1073/pnas.0508591102 (2005)

Researchers are homing in on the genetic causes of dyslexia, a complex reading disorder that affects 5–17% of the population and that seems to be highly heritable.

Previous studies have linked a region of chromosome 6 with a predisposition to dyslexia. Jeffrey Gruen, of the Yale Child Health Research Center in New Haven, Connecticut, and his colleagues examined this region in 153 families affected by reading disability. They all possessed the same deletion in the *DCDC2* gene. The exact function of the gene remains unknown, but when the researchers decreased levels of the *DCDC2* gene product in rats, some neurons in the rodents' brains failed to develop properly.

CELL BIOLOGY

Building site

Science doi:10.1126/science.1119969 (2005)

Just as cells must replicate their chromosomes when they divide, so too must they duplicate bodies in the cytoplasm. A chance observation now provides insight into how the cytoplasm's Golgi apparatus, which processes and distributes proteins, is copied.

Graham Warren and colleagues from Yale University in New Haven, Connecticut, used antibodies to label centrin proteins in the single-celled parasite *Trypanosoma brucei*. This revealed a structure near the Golgi that contained centrin2. This protein had previously been seen only in the centrosome — which coordinates the growth of some of the cell's skeletal elements. The structure may provide the site at which the new Golgi is assembled.

JOURNAL CLUB

Anthony Ryan
University of Sheffield, UK

Britain's ICI professor of physical chemistry gives praise to his competitors.

Don't you just hate it when you read a paper and wonder "Why didn't I think of that?".

This was my reaction on reading Michael Massa and Kari Dalnoki-Veress's work in *Physical Review Letters* (92, 255509; 2004). They present a technique to study nucleation — the way that crystallization starts. It is elegantly simple compared with the brute-force method that my team has been using.

Crystallization defines the properties, both mechanical and aesthetic, of most plastics we use every day. And as polymers find more and more uses in nanoscale electronic devices and flexible displays, controlling polymer crystallization will become ever more important.

In small volumes of polymer, crystallization will start spontaneously rather than at the site of a defect or impurity, as happens in large volumes. My team has been investigating how crystallization proceeds in finely divided matter using block copolymers that create nanometre-sized spheres of polymer.

But our progress in studying spontaneous nucleation has been laborious, because each time we wanted to change the volume of the spheres we had to synthesize new block copolymer molecules.

Massa and Dalnoki-Veress, both of McMaster University in Ontario, Canada, instead used the process of dewetting — where a thin liquid film breaks up into droplets — to create an array of thousands of microdroplets with a range of sizes.

The researchers go on to show that the theory of spontaneous nucleation is valid right down even at the molecular scale.

Although disappointed that we didn't think to combine dewetting and crystallization (we study both), I am consoled by the fact that the authors quote some of our work as their inspiration. Thanks!