RESEARCH HIGHLIGHTS

P. VARGAS, EXCEPT TOP LEFT, C. HERRERA AND TOP SECOND LEFT, O. F. SAPIR

Flower power

Proc. R. Soc. B doi:10.1098/rspb.2009.2163 (2010)

Europe's carnations have diversified faster than any plant group studied so far — a surprising finding that counters the idea that European plants form new species more slowly than tropical plants.

Luis Valente of the Royal Botanical Garden of Madrid and his colleagues analysed specific DNA sequences from plants belonging to 104 species of European carnation (*Dianthus* spp., pictured) to trace the relationships among them. They found that carnations have been accumulating new species at the speedy rate of 2.2–7.6 per million years. By comparison, lupins (*Lupinus* spp.) of the tropical Andes have generated only 1.3–3.8 new species per million years.

One possible explanation offered by the authors is that carnations, which flower during dry summer months when pollinators are scarce, have developed diverse floral arrangements to compete for pollinators.

ENGINEERING

Sticky when wet

Proc. Natl Acad. Sci. USA doi:10.1073/pnas.0914720107 (2010)

Inspired by leaf beetles' way of sticking to leaves, researchers have created a device that uses the surface tension of many water droplets to adhere to a variety of surfaces.

Michael Vogel and Paul Steen of Cornell University in Ithaca, New York, devised a system in which water is pumped through hundreds of tiny holes in a plate by an electric pulse. The surface tension of the droplets being pushed through these holes generates the adhesive force. When the plate comes close enough to another surface, the droplets form 'liquid bridges' with the object to hold it. To release, the water is pumped back into the device, breaking the bridges.

The duo show that the device can hold its own weight plus a payload (pictured right) for several minutes.

M. J. VOGEL

PHYSICS

Plasma pinch

Nature Phys. doi:10.1038/nphys1510 (2010)

Charged particles trapped in Earth's magnetic field form a plasma, and tend to clump together when disturbed by the turbulent solar wind. This 'pinching' effect has been replicated in the laboratory to create a hot, dense plasma. The achievement opens up the possiblity of developing a device to fuse deuterium and helium-3 — a process that could replace radioactive tritium-based reactions in proposed fusion reactors.

Michael Mauel of Columbia University in New York and his co-workers used a copper magnet to levitate a half-tonne superconducting dipole magnet. Microwave energy injected into a deuterium-gas-filled vessel containing the levitating magnet created the hot plasma; it also induced electric fluctuations that caused the ionized particles to pile up in the plasma's core.

ORGANIC CHEMISTRY

Methylene magic

Science **327,** 566–571 (2010)

Many organic molecules are made up of multiple methylene units ($-CH_2-$) in which the carbon–hydrogen bonds are inert to most reagents. Selectively converting just one of these methylenes into something else — to build a drug molecule, for example — is one of the biggest challenges in organic chemistry.

Mark Chen and Christina White at the University of Illinois at Urbana-Champaign have now developed an iron-based catalyst that can help hydrogen peroxide to oxidize specific methylene groups in a predictable manner, mimicking the actions of natural iron-containing enzymes. This process turns methylene into an oxygen-containing chemical group, which can be modified further in subsequent reactions.

The researchers demonstrated their technique on a series of terpenoids, the largest and most diverse set of naturally occurring organic compounds.

ASTROPHYSICS

Starlight versus dark matter

Astrophys. J. **710,** 236–247 (2010)

A surplus of high-energy electrons reported by instruments such as NASA's Fermi Gamma-ray Space Telescope has been interpreted as an indirect signal of dark matter, which is thought to make up around 85% of the Universe's matter. But starlight is enough to cause this excess of electrons, say Łukasz Stawarz and his colleagues at Stanford University in California.

They developed a model of electron propagation through the galaxy that they say more rigorously accounts for the effect of starlight on the electrons. By selectively scattering electrons of specific energies, starlight suppresses most electron energies in a way that gives the impression that there is