RESEARCH HIGHLIGHTS

Aphid deception

Proc. Natl Acad. Sci. USA doi:10.1073/pnas.0907191107 (2010)

Many insect-borne plant pathogens alter the plants they infect in ways that enhance the pathogens' spread from plant to plant. Unlike some plant viruses, which are best transmitted if their insect carriers feed for a long time on the plant, the aphid-borne cucumber mosaic virus (CMV) is transmitted effectively only if aphids rapidly disperse to new susceptible plants.

To explore the interaction between CMV, its carriers and infected plants, Mark Mescher and his colleagues at Pennsylvania State University in University Park looked at how the virus affects the squash plant *Cucurbita pepo* and its interactions with two aphid carriers — *Myzus persicae* (pictured) and *Aphis gossypii*.

The team discovered that the virus causes infected plants to release higher levels of volatile compounds than uninfected plants, thus attracting more aphids. The aphids then emigrate from the infected plants more quickly than from healthy plants, so increasing the chance of virus spread.

K. MAUCK

GEOSCIENCE

Shocking tides

Geophys. Res. Lett. doi:10.1029/2009GL041581 (2010)

The gravitational pull of the Sun and Moon raise minute tides in Earth's crust, which can alter the stress on faults. Seismologists have long debated whether these 'Earth tides' can trigger earthquakes. Now Sachiko Tanaka of the National Research Institute for Earth Science and Disaster Prevention in Tsukuba, Japan, reports finding a link between Earth tides and the three huge earthquakes that occurred off the west coast of Sumatra in 2004, 2005 and 2007.

Tanaka found that during the decade before each megashock, faults in the region tended to produce smaller, more frequent earthquakes when stressed by tidal forces.

This correlation vanished after the mammoth quakes, suggesting that the relatively small tidal forces helped trigger quakes on fault segments that were near a critical threshold.

MATERIALS SCIENCE

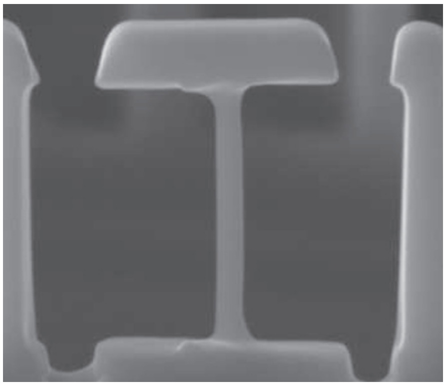
Small, strong and supple

Nature Mater. doi:10.1038/nmat2622 (2010)

Strong materials, such as ceramics, are often brittle and prone to snapping — but those that deform gracefully under tension, such as metals, are weaker.

Now, Dongchan Jang and Julia Greer from the California Institute of Technology in Pasadena have overcome this trade-off with zirconium-based metallic glasses — alloys that are formed of disordered metal atoms and that can be moulded when heated. They show that when the material is reduced in size to pillars measuring 100 nanometres in diameter (pictured below), it assumes both a metal-like ductility and a ceramic-like strength.

The authors suggest that internal flaws in the glass — which would shear the alloy apart in bulk form — find it much harder to propagate through the nanometre-scale structure.



D. JANG

EVOLUTION

All thumbs and toes

Evolution doi:10.1111/j.1558-5646.2010.00944.x (2010)

Although both the thumbs and big toes of humans are longer and stronger than those of African apes, the different abilities they confer have led scientists to believe that the digits evolved independently. However, it seems that human hands and feet may have evolved together after all.

Campbell Rolian of the University of Calgary in Canada and his colleagues compared hand and foot traits from 202 adult humans and 89 chimpanzees. They found that the traits vary together in each species; for example, long thumbs correlate with long big toes. The researchers then simulated how selection pressure on one extremity affects the other's shape. Feet and hands still varied together, which suggests that they coevolved.

The authors propose that the evolution of long, strong big toes for bipedalism caused similar changes in the thumb, which may have improved dexterity and led to the use of stone tools.

APPLIED PHYSICS

Speedier than silicon

Science **327**, 662 (2010)

Graphene is a one-atom-thick sheet of carbon. Among its unusual properties is high electrical conductance: electrons glide much faster through graphene than other materials such as silicon, making graphene attractive for use in microchips.

Yu-Ming Lin, Phaedon Avouris and their colleagues at IBM's T. J. Watson Research Center in Yorktown Heights, New York, have created a field-effect transistor — a key component of microchips — in which the channel, the part through which electrons flow, is made of graphene.

The graphene allowed the transistor to switch at speeds of up to 100 gigahertz, more than twice as fast as current silicon transistors.