lower the material's elasticity.

Jeremiah Johnson and his colleagues at the Massachusetts Institute of Technology in Cambridge have developed a method to count the number of the most common loops in polymeric materials. The authors broke a hydrogel, a type of polymer network that soaks up water, into quantifiable fragments that reflected the connectivity of the original network, then used mass spectrometry to count the loops. They found that too many loops prevented the gel from forming.

The researchers say they are now using their method to correlate the effects of loops on the mechanical properties of a variety of polymer networks.

Proc. Natl Acad. Sci. USA **http://dx.doi.org/10.1073/pnas.1213169109 (2012)**

ANIMAL BEHAVIOUR

Wrens learn as embryos in the egg

A single song element is all that superb fairy-wren nestlings need to include in their begging calls to get fed by their mothers, and, in an unusual example of prenatal learning, the nestlings seem to learn this 'password' as embryos.

Adult superb fairy-wrens (*Malurus cyaneus*; **pictured**) use these begging calls to distinguish their offspring from those of two cuckoo species that often invade their nests. Sonia Kleindorfer at Flinders University in Adelaide, Australia, and her team analysed recordings of the fairy-wren calls and found that each nest had a common begging call different from those of all other nests. That call contained a signature element also found in the call the mother made while incubating her eggs. When the team swapped eggs around across 22 nests, nestlings from those eggs begged using the calls of their foster, not their biological, mothers, suggesting that the calls were learned.

Curr. Biol. **http://dx.doi.org/10.1016/j.cub.2012.09.025 (2012)**

D. WATTS/NATUREPL.COM

NEUROTECHNOLOGY

Brain–machine does the two-step

Brain–machine interfaces (BMIs) detect and use brain activity to perform an intended task, and could be invaluable to people with paralysis. Typically, BMIs are able to process only single movements, but one developed by Ziv Williams at Harvard Medical School in Boston, Massachusetts, and his colleagues can control a series of motions — potentially expanding the complexity of tasks that BMIs can perform.

The team recorded brain activity in monkeys that were trained to move a computer cursor with their paws to each of two areas on a screen in a particular order. This revealed activity in two distinct groups of neurons in the brain's premotor cortex that was associated with each of the upcoming movements. The authors then programmed a computer to decode this signal from the brain and found that the mind-controlled computer moved the cursor at about the same speed that the monkeys achieved with their paws.

Nature Neurosci. **http://dx.doi.org/10.1038/nn.3250 (2012)**

NEUROSCIENCE

When neurons mature too early

A genetic mutation linked to intellectual disability and autism causes the premature formation of functional connections between brain cells during a crucial window of development early in life.

Mutations that inactivate one copy of the gene *SYNGAP1* often cause intellectual disability in humans. Gavin Rumbaugh of the Scripps Research Institute in Jupiter, Florida, and his team found that mice with a similar mutation produce neurons that mature too quickly after birth and become overactive in a brain region important for cognitive function. Mice with one copy of *SYNGAP1* have memory problems and are prone to seizures — a symptom in humans with the mutations.

Correcting the mutation in mice after this developmental period had little effect on the symptoms, and introducing the mutation into adult mice did not affect neuronal function — suggesting that the activity of the SYNGAP1 protein during this developmental window has long-lasting effects.

Cell 151, **1–15 (2012)**

COMMUNITY CHOICE

The most viewed papers in science

CHEMISTRY

Mega-MOF's super surface

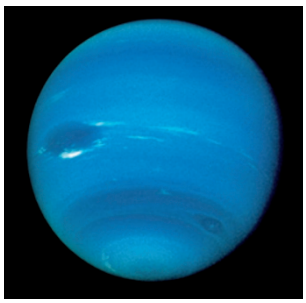
HIGHLY READ on pubs.acs.org in September

Metal–organic frameworks, or MOFs, are of interest for applications such as catalysis and gas storage. Researchers now report a method that allowed them to synthesize these porous crystals with record-breaking surface areas.

Omar Farha at Northwestern University in Evanston, Illinois, and his colleagues created two copper-based MOFs, each with a surface area of approximately 7,000 square metres per gram. To help boost surface area, they used supercritical carbon dioxide to activate the MOFs, avoiding framework collapse, which can occur when the solvents used in MOF synthesis are removed.

Moreover, the authors calculated that by using acetylenes, rather than more bulky phenyls, as links in their framework, they could further increase the theoretical maximum surface area of MOFs to as high as 14,600 square metres per gram, roughly 40% higher than some previous estimates, the team suggests.

J. Am. Chem. Soc. 134, **15016–15021 (2012)**



NASA/SPL

ASTRONOMY

More co-orbiters for Neptune

Some astronomers think that Neptune (**pictured**) can no longer capture objects whose orbits around the Sun are similar to its own. But Carlos and Raúl de la Fuente Marcos at the Complutense University of Madrid in Spain, have discovered that four objects originally classified as minor planets are actually co-orbiters that joined Neptune's orbit as recently as 50,000 years ago.

The work brings to 14 the number of objects that, like Neptune, orbit the Sun every 165 years. The four latest objects are not in the plane of the Solar System and follow eccentric paths. One is likely to diverge from its current path just 2,000 years from now.

Astron. Astrophys. 547, **L2 (2012)**

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