

RESEARCH HIGHLIGHTS

ELECTRONICS

Silicon enhancement

Science **321**, 1069–1071 (2008)

The formation of compounds containing silicon usually involves the silicon atoms changing their oxidation states. But Gregory Robinson, Paul von Schleyer and their colleagues at the University of Georgia in Athens have produced a stable silicon compound in which the silicon stays in its 'zero oxidation state'. Silicon atoms in this state are normally highly reactive, but on this occasion are attached to large carbon-based rings that stabilize them.

The researchers verified this outcome with X-ray crystallography: if the silicon atoms were in an oxidation state of '+2', the molecule would be flat, but it is bumpy. And from bond-length measurements, it seems that the two silicon atoms in the compound are connected to each other by a double bond. They have one free pair of electrons and another pair donated by the organic attachment.

EVOLUTIONARY BIOLOGY

Commonality and cuckoos

Behav. Ecol. Sociobiol. doi:10.1007/s00265-008-0618-0 (2008)

Natural selection is driving birds that are parasitized by common cuckoos (*Cuculus canorus*) to lay clutches of more uniformly patterned eggs, researchers have found.

Working around the village of Apaj near Kiskunság National Park in Hungary, Csaba Moskát of the Hungarian Academy of Sciences and his co-workers painted different numbers of specks onto the first three eggs laid in ten great reed warbler (*Acrocephalus arundinaceus*, pictured below) nests. They then painted the fourth eggs to arrive in those nests and in 21 others

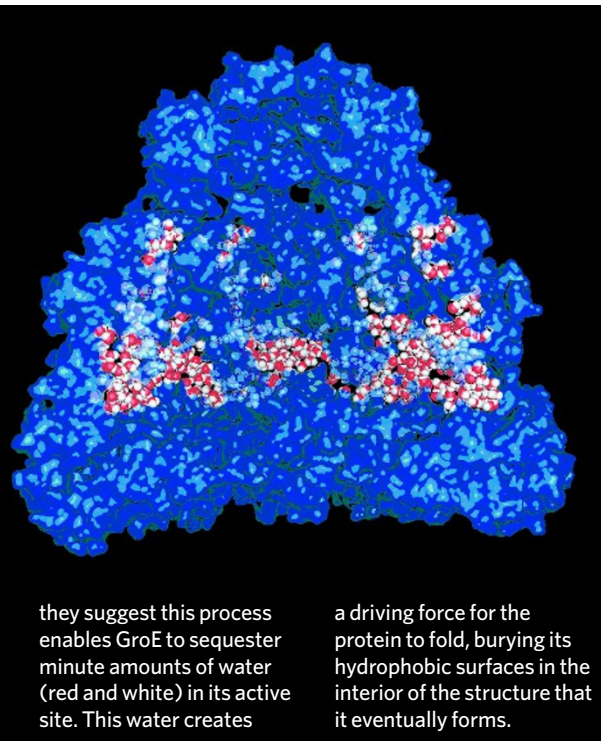


Water bomb

J. Am. Chem. Soc. doi:10.1021/ja802248m (2008)

Water trapped inside barrel-shaped enzymes called chaperonins could be crucial to the way they help proteins fold. Without such attendance, complicated proteins would fail to form their proper arrangement, and consequently would not work.

Vijay Pande and his colleagues at Stanford University in California followed the change in shape that exposes hydrophilic chemical groups on the inner surface of a chaperonin complex called GroE (pictured) as the enzyme takes in an unfolded protein. Using computer simulations,



they suggest this process enables GroE to sequester minute amounts of water (red and white) in its active site. This water creates

a driving force for the protein to fold, burying its hydrophobic surfaces in the interior of the structure that it eventually forms.

to look like parasitic eggs.

Egg uniformity foils cuckoos, the warblers' behaviour revealed. Warblers with eggs manipulated to be more different from one another tolerated the fake parasitic egg 40% of the time; that figure was just 5% for the 21 control nests.

MICROBIOLOGY

Suffocating tuberculosis

Proc. Natl Acad. Sci. USA **105**, 11945–11950 (2008)

A compound that inhibits the production of ATP, the primary energy carrier in cells, could make treating tuberculosis a little easier, report Kevin Pethe at the Novartis Institute for Tropical Diseases in Chromos, Singapore, and his colleagues. The disease-causing bacterium *Mycobacterium tuberculosis* can evade treatment by entering into a quiescent, non-dividing state that is resistant to current therapies.

Pethe and his team found that ATP levels in these bacteria are five- to sixfold lower than normal, but that quiescent *M. tuberculosis* does still require ATP to survive. They reasoned that this could render the microbe particularly susceptible to drugs that inhibit ATP synthesis. And, as it turns out, one such inhibitor that acts in a dose-dependent manner, R207910, kills quiescent *M. tuberculosis* at levels that don't kill other cells.

PARTICLE PHYSICS

Antimatter bounces back

Phys. Rev. A **78**, 022506 (2008)

In the early 1990s, physicists at CERN in Switzerland watched as antiprotons and helium annihilated in flashes of energy. But their experiment also yielded an unexplained secondary string of annihilations in the facility's experimental chamber.

Andrea Bianconi of Italy's National Institute of Nuclear Physics in Brescia and his colleagues have now modelled what happened. Their calculations show that some antiprotons bounced off the aluminium back wall before striking helium atoms. Their model, which matches the data, shows that roughly a quarter of the antiprotons were reflected by aluminium nuclei. Not all matter–antimatter interactions end with a bang, it seems.

EVOLUTION

Serotonin for mothers

Nature Neurosci. doi:10.1038/nn.2176 (2008)

The neurotransmitter serotonin is known to be important in mood and behaviour; now researchers have shown that its function is also essential to the survival of baby mice.

Evan Deneris at Case Western Reserve University in Cleveland, Ohio, and his colleagues compared the reproductive success of normal mice with that of animals