The researchers then examined the 'ears' of *A. aegypti*, and confirmed that both sexes can hear up to 2,000 hertz. They call for more research on the mating behaviours of the mosquitoes, which carry yellow fever and dengue virus.

CHEMICAL SYNTHESIS

Take that, flu

Angew. Chem. Int. Edn doi:10.1002/anie.200804883 (2009)

With the constant threat of a flu pandemic, the quest for cheaper, more efficient routes by which to make the flu treatment Tamiflu is keeping chemists busy. Yujiro Hayashi and his team at the Tokyo University of Science report the highest-yielding route so far using inexpensive reagents and just nine reactions, all in three one-pot processes.

The first pot uses diphenylprolinol silyl ether, an organocatalyst — a class of catalysts that don't involve expensive and toxic metals. The organocatalyst helps the first two starting materials to react, and they go on to react with a third. The product goes into pot two to undergo a domino reaction — a cascade of reactions whereby each group of a molecule with many functional groups reacts in turn. In pot three, the final three reactions produce Tamiflu, or (–)-oseltamivir, in 57% yield.

The authors say that their scheme is ideal for large-scale production.

CELL BIOLOGY

Lost nuclei

J. Cell Biol. doi:10.1083/jcb.200811035 (2009)

Certain mutations in the gene *LMNA* cause a rare form of muscular dystrophy, possibly through improper positioning of cell nuclei. The disease, called autosomal dominant Emery-Dreifuss muscular dystrophy (AD-EDMD), and others like it are puzzling because the mutant proteins — in this case lamins A and C — are expressed throughout the body, not just in affected tissues.

Tom Misteli of the US National Cancer Institute in Bethesda, Maryland, and his colleagues looked at muscle fibres from mouse models of the disease and compared them with those of normal mice. Muscle fibres contain hundreds of nuclei, but a handful are recruited to the point where muscle and neuron meet, the neuromuscular junction. In the diseased mice, proteins found in muscle that mediate that recruitment don't associate properly with lamin A. The nuclei get misplaced, neuromuscular junctions become malformed and gene expression in the cells is disrupted.

EVOLUTIONARY BIOLOGY

Headstrong

PLoS ONE doi:10.1371/journal.pone.0003980 (2008)

Large body size confers obvious advantages in cricket fights, but Chinese gamblers have also looked to the head when placing their bets going back some eight centuries. New research bolsters the practice, providing the first evidence that males have developed larger heads — and mouth parts — as weaponry in aggressive turf battles.

Kevin Judge and Vanessa Bonanno at the University of Toronto Mississauga in Canada pitted fall field crickets (*Gryllus pennsylvanicus*) of similar body size against each other; those with bigger heads and mouth parts won 75% of battles that escalated to 'grappling'. The bigger the difference in head size, the more likely the head-strong cricket was to win.

But the team found no evidence of signalling that would influence disputes settled before grappling took place, suggesting that evolutionary selection takes place in the heat of the battle.

WANG YING/COLORCHINAPHOTO/NEWSCOM

CHEMISTRY

An aromatic hybrid

Angew. Chem. Int. Edn doi:10.1002/anie.200805554 (2008)

After years of trying, chemists have finally made a molecule somewhere between benzene (C_6H_6), and its inorganic boron/nitrogen equivalent borazine ($B_3N_3H_6$).

In the molecule, 1,2-dihydro-1,2-azaborine, one of benzene's carbon atoms is replaced with a nitrogen, and another with a boron atom. Scientists have been trying to make this compound since the 1960s, with no luck. David Dixon at the University of Alabama in Tuscaloosa, Lev Zakharov at the University of Oregon in Eugene and their colleagues have now succeeded. The compound, which they made by stabilizing the reactive intermediates with a chromium-based protecting unit, is stable, and like benzene is aromatic, although not as strongly.

JOURNAL CLUB

Jason W. Chin
MRC Laboratory of Molecular Biology, Cambridge, UK

A molecular biologist gets excited about making designer proteins in cells.

The genetic code describes the relationship between the heritable information in the genome and the amino acids that are strung together to make proteins. This code, like any that contains redundancy, is open to hacking, and I have long been fascinated by how the process of translation, by which cells string amino acids together, might be reprogrammed to make new polymers. Several labs have already manipulated cells to incorporate designer amino acids into their proteins.

But Peter Schultz and his colleagues at the Scripps Research Institute in La Jolla, California, have achieved something remarkable. Proteins are made from a set of 20 amino acids, each of which contains an amine and a carboxylic acid group flanking a central carbon atom. Schultz's team engineered a bacterial cell to work with amino-acid-like molecules called α-hydroxy acids that have an alcohol group where the amine would normally be. During translation, instead of forming an amide bond to link polymer subunits, this α-hydroxy acid forms an ester bond (J. Guo *et al. Angew. Chem.* **120,** 734–737; 2008).

Replacing a nitrogen and a hydrogen atom in a polymer chain with an oxygen atom might seem like a slight change, but it means that a protein can now be specifically cut at the ester bond in basic solution. Making esters from α-hydroxy acids may first have been achieved with ribosomes in a test tube in the 1970s, but turning the process into a heritable, genetic property is a major advance: it takes synthetic biologists closer to creating organisms with designer codes to make new polymers.

One day soon, the creativity and skill with which chemists can make molecules will be coupled to the selective power of organismal evolution. And we will watch new life forms boot up.

Discuss this paper at **http://blogs.nature.com/nature/journalclub**